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Muramatsu

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(45) **Date of Patent: Aug. 26, 2025**

(54) **VEHICULAR LAMP**

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F21S 41/255 (2018.01)

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CPC ***F21S 45/48*** (2018.01); ***F21S 41/24*** (2018.01); ***F21S 41/255*** (2018.01)

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CPC F21S 41/143; F21S 41/24; F21S 45/47; F21S 45/48
See application file for complete search history.

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(74) *Attorney, Agent, or Firm* — Sughrue Mion, PLLC

(57) **ABSTRACT**

A vehicular lamp (**100**) includes a substrate (**24**), a light source (**22***a*), a projection lens (**30**), and a light guidance body (**40**) having an incident surface (**44***a*). A first space (**201**) is provided between a first region (**441***b*) and the substrate (**24**), the first region (**441***b*) including, on the incident surface (**44***a*), a part of an outer peripheral edge of the incident surface (**44***a*), and a second space (**203**) communicates with the first space (**201**) and is in contact with a second region (**441***c*) including, on the incident surface (**44***a*), the other part of the outer peripheral edge of the incident surface (**44***a*). A width of the second space (**203**) is wider than a width of the first space (**201**) in an emission direction of the light from the light source (**22***a*).

15 Claims, 10 Drawing Sheets

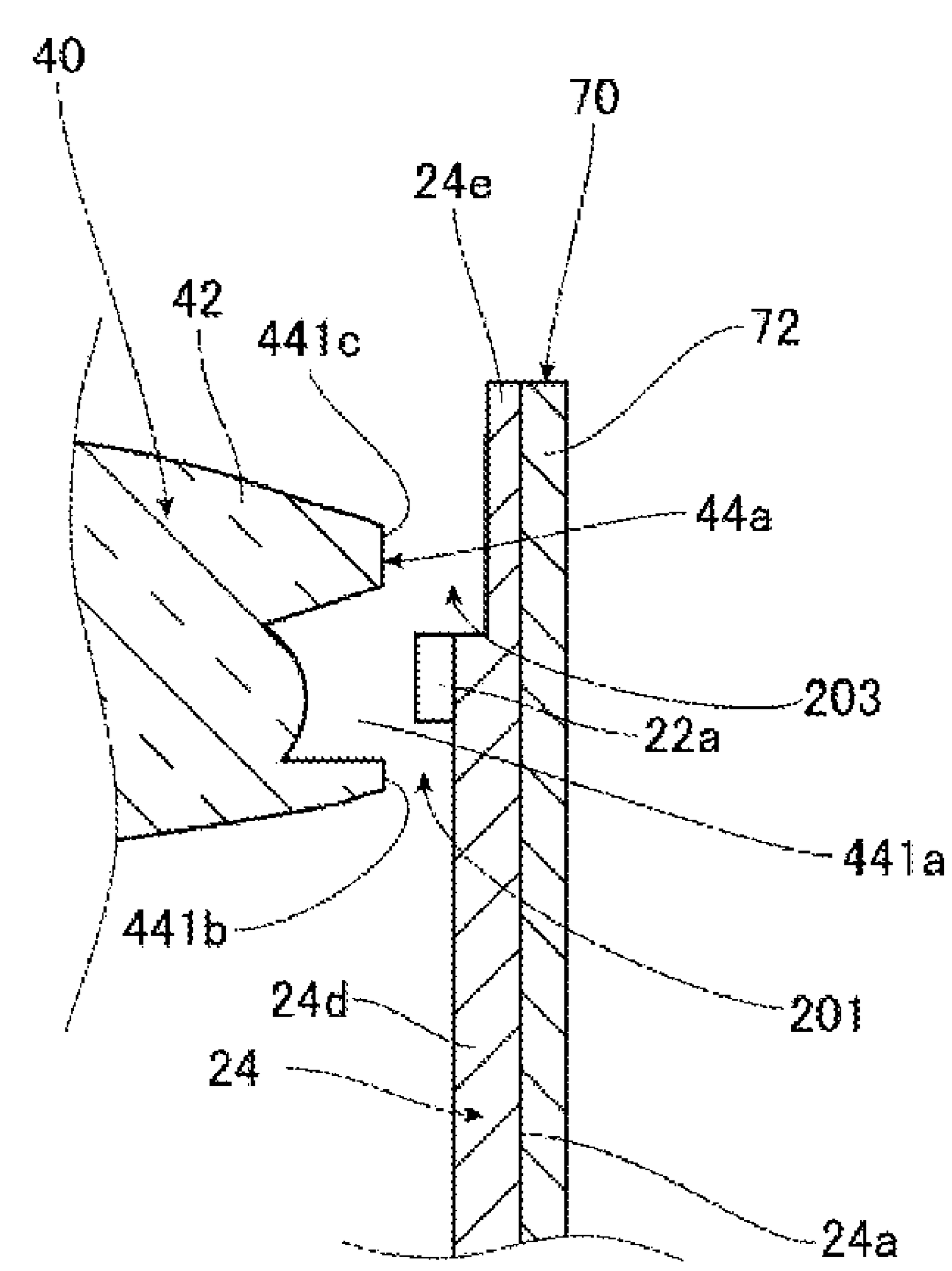

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FIG. 1

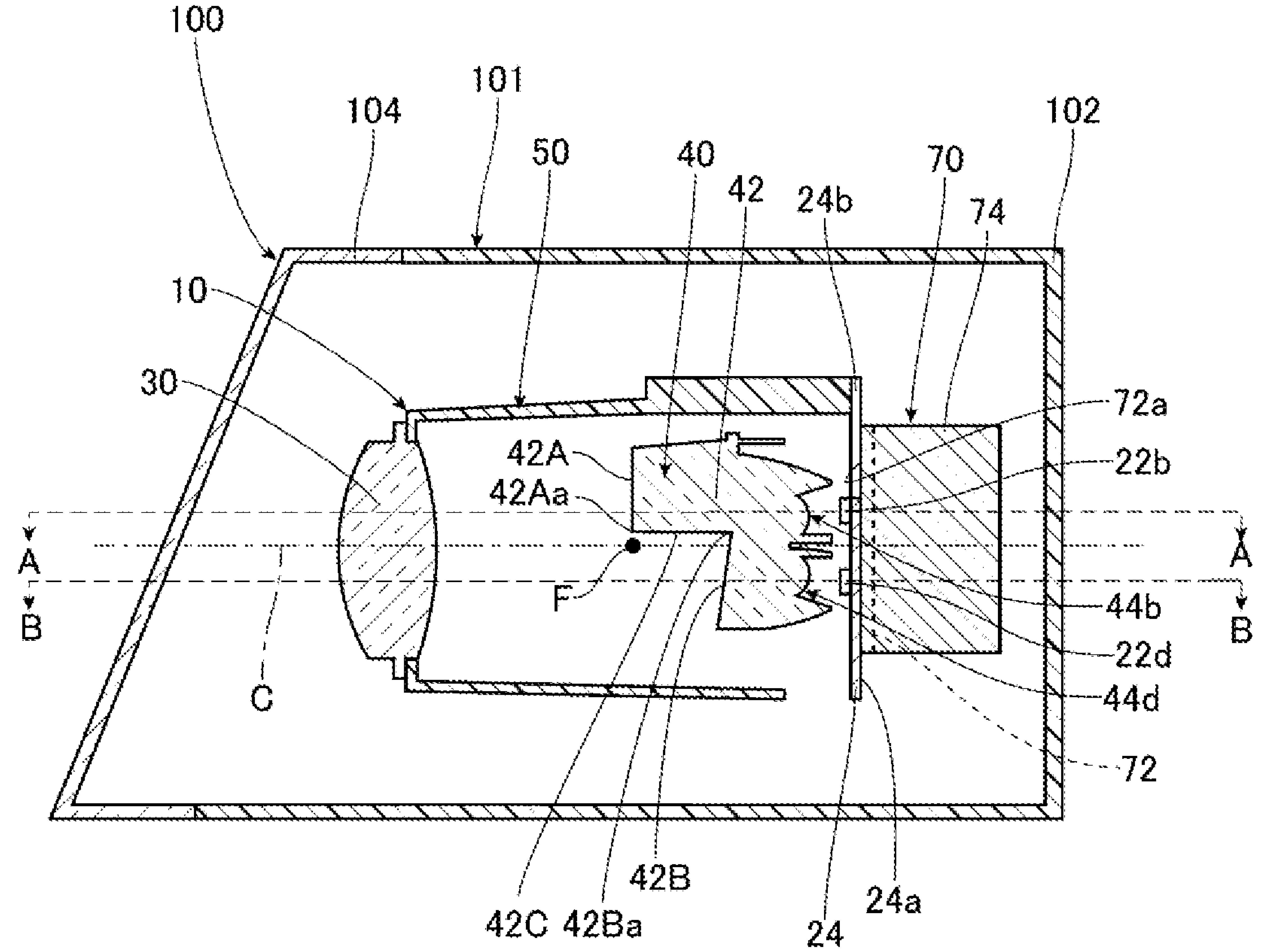
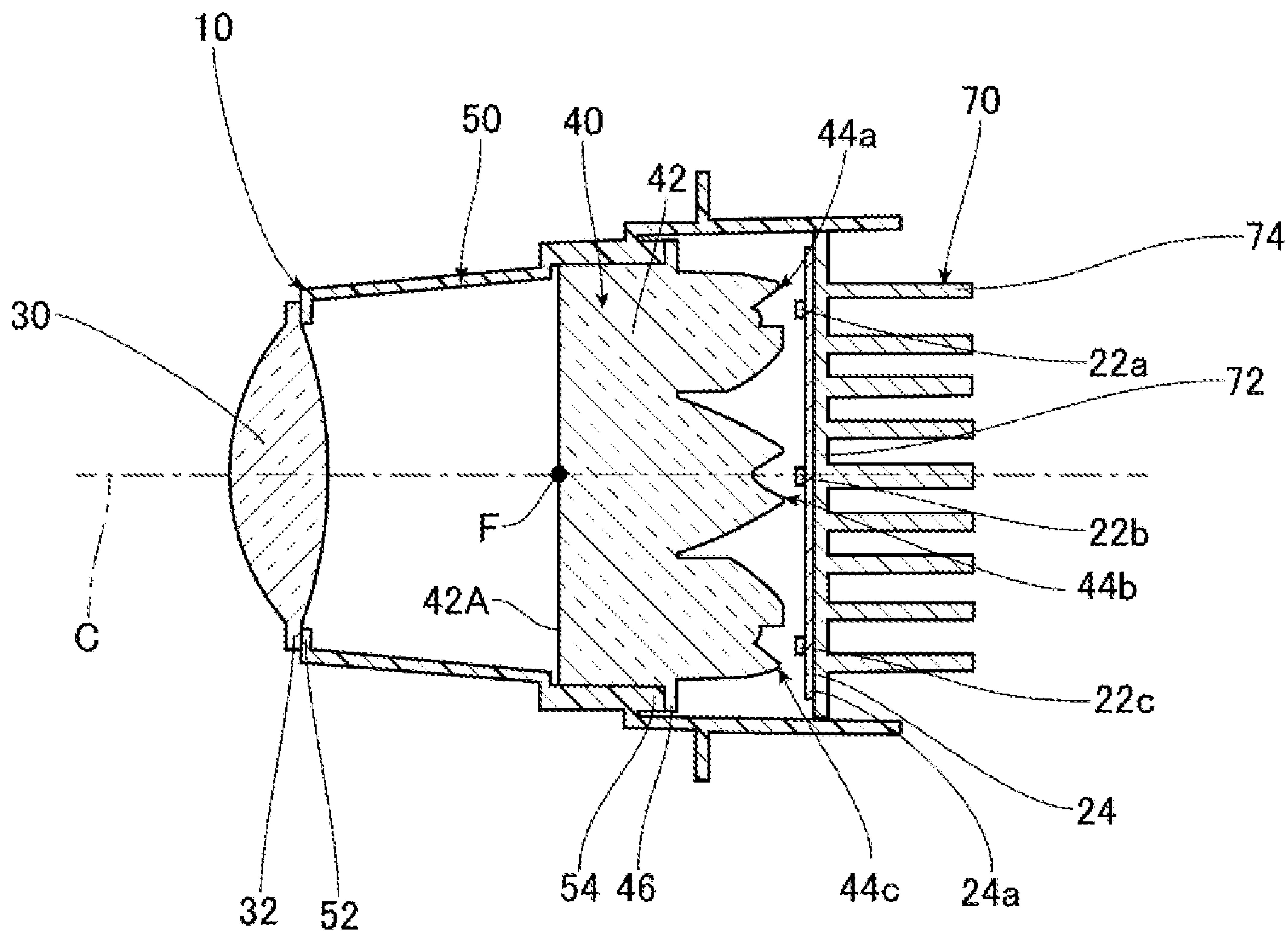

100
101
104
102
50
40
42
24b
70
74
10
30
72a
42A
22b
42Aa
A
A
F
44b
B
B
22d
C
44d
72
42B
24a
42C 42Ba
24

FIG. 2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50
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44a
70
42
74
30
22a
72
22b
F
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42A
C
22c
24
54 46
44c
24a
32
52

FIG. 3

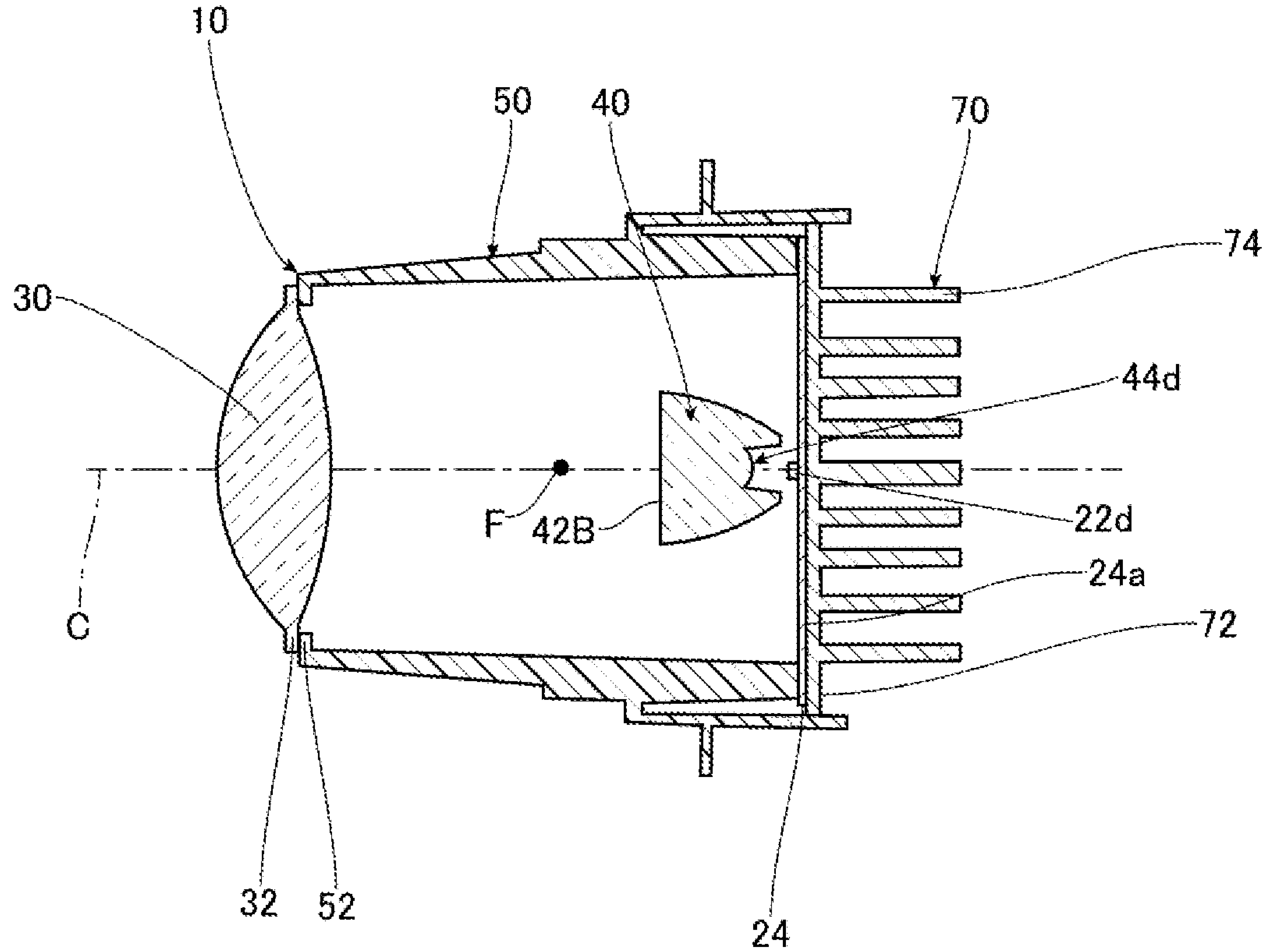
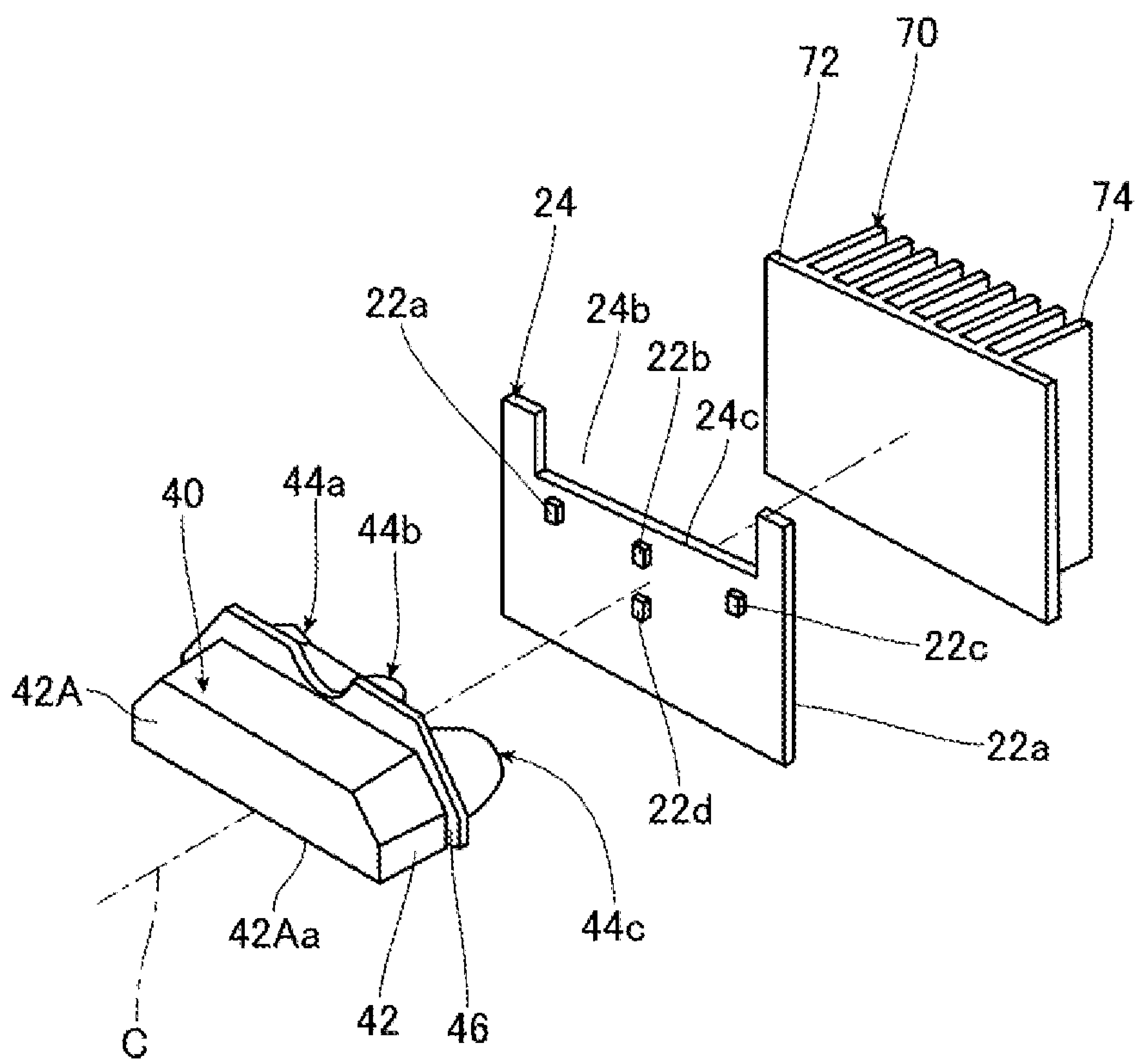

10
50
40
70
74
30
44d
F
42B
22d
24a
C
72
32
52
24

FIG. 4


72
70
24
74
22a
24b
22b
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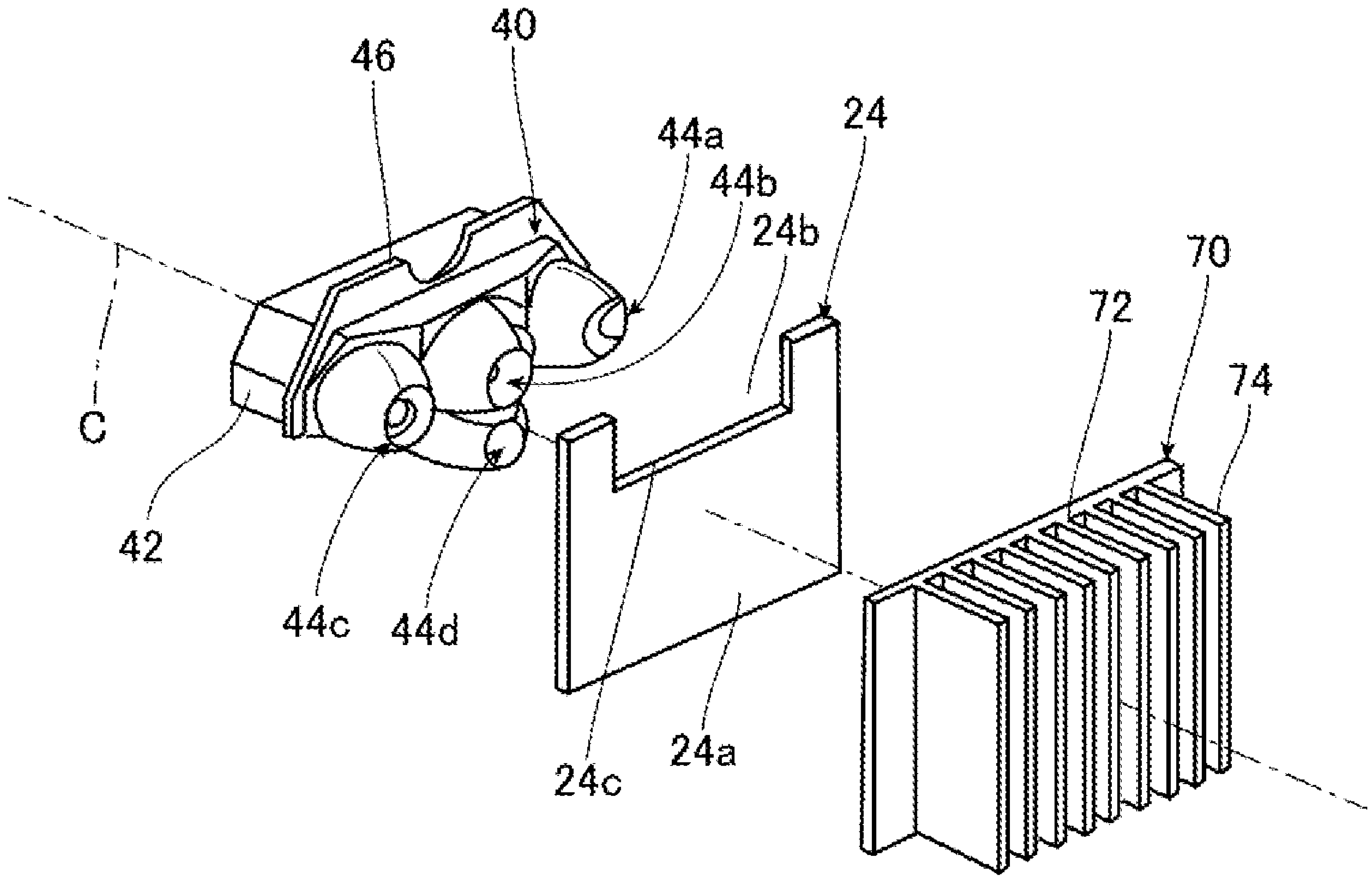
40
44a
44b
22c
42A
22a
22d
44c
42Aa
C
42
46

FIG. 5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40
44a
44b
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24b
70
72
74
C
42
44c
44d
24c
24a

FIG. 6

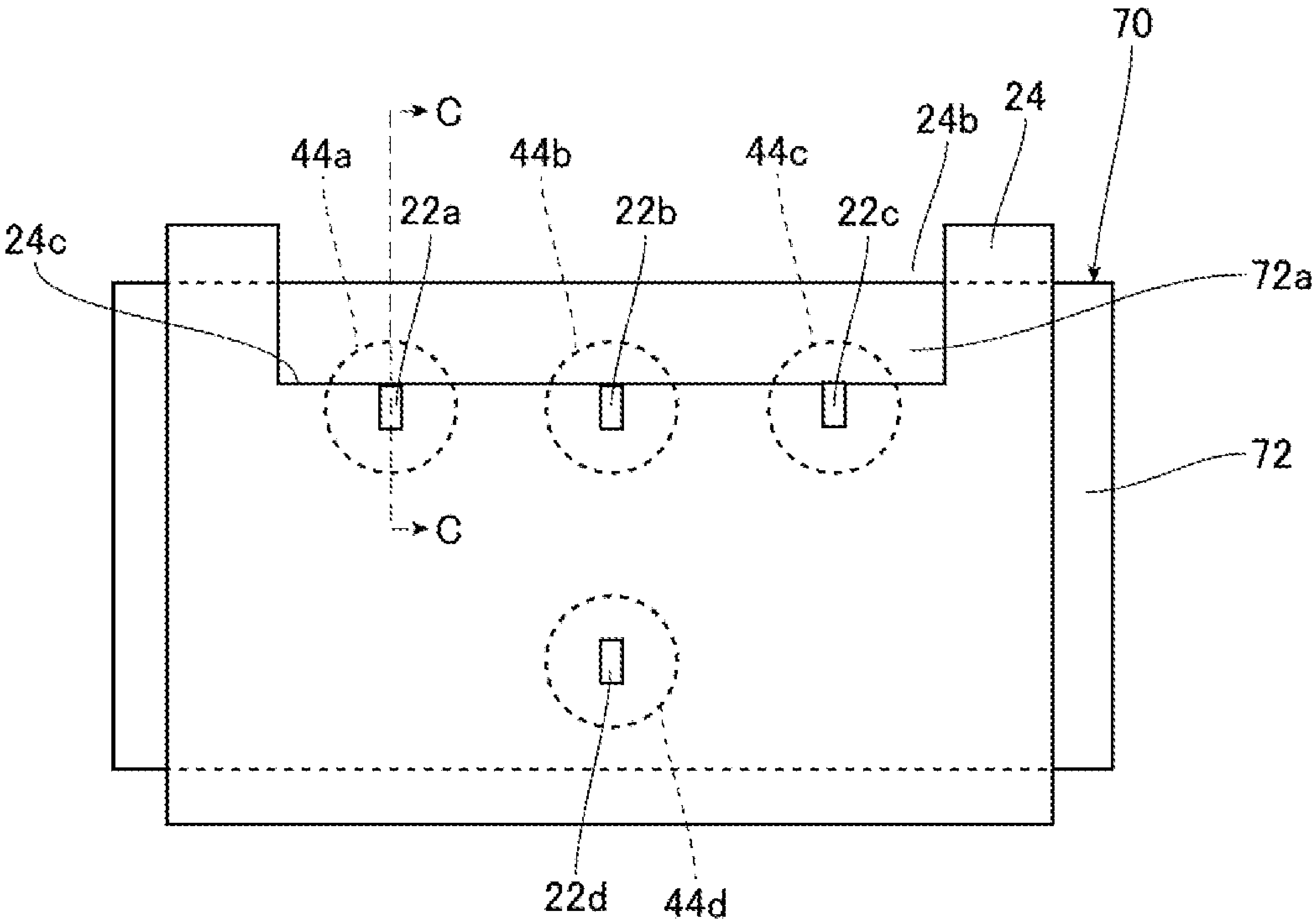

70
C
24b
24
44a
44b
44c
22a
22b
22c
24c
72a
72
C
22d
44d

FIG. 7

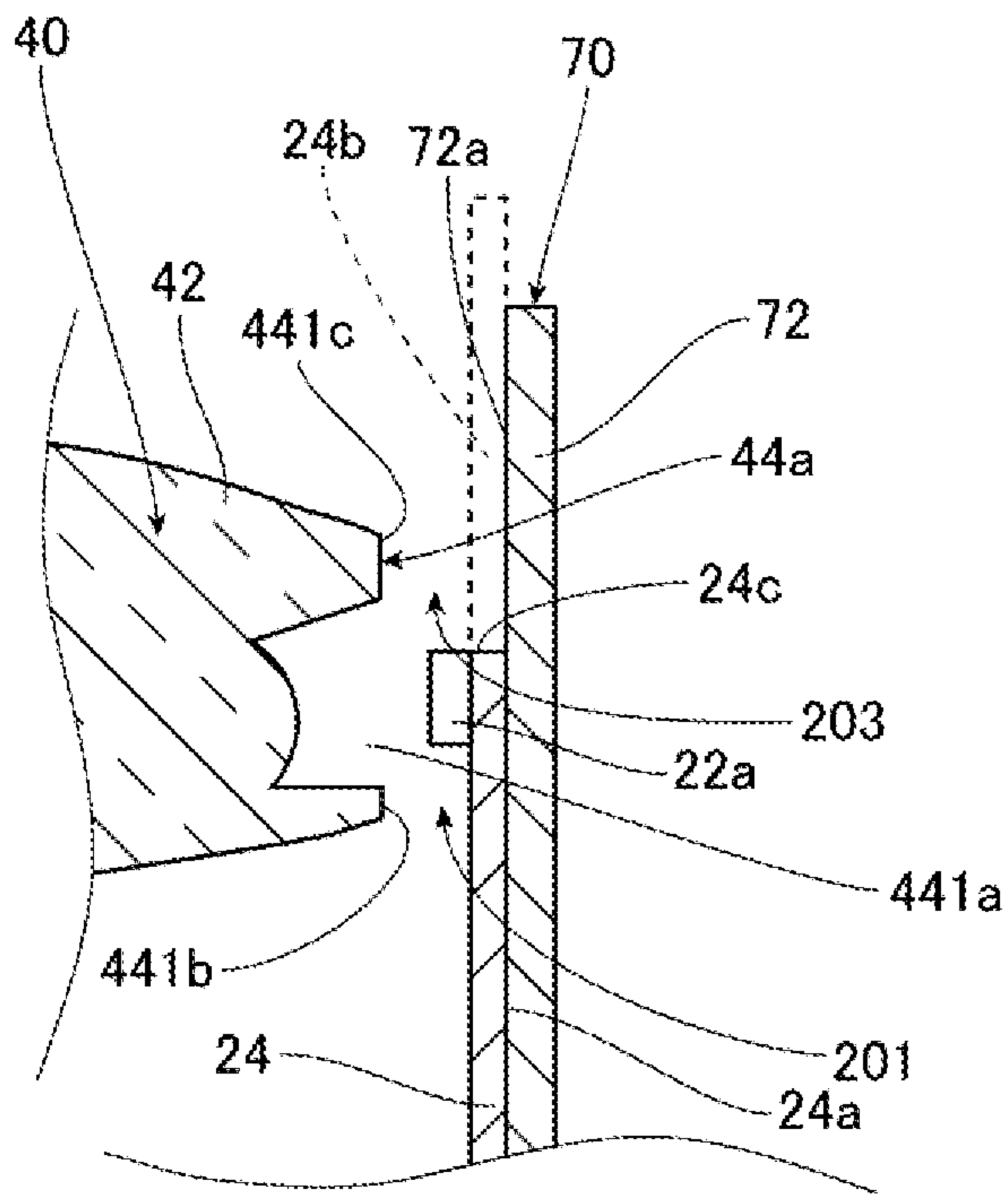
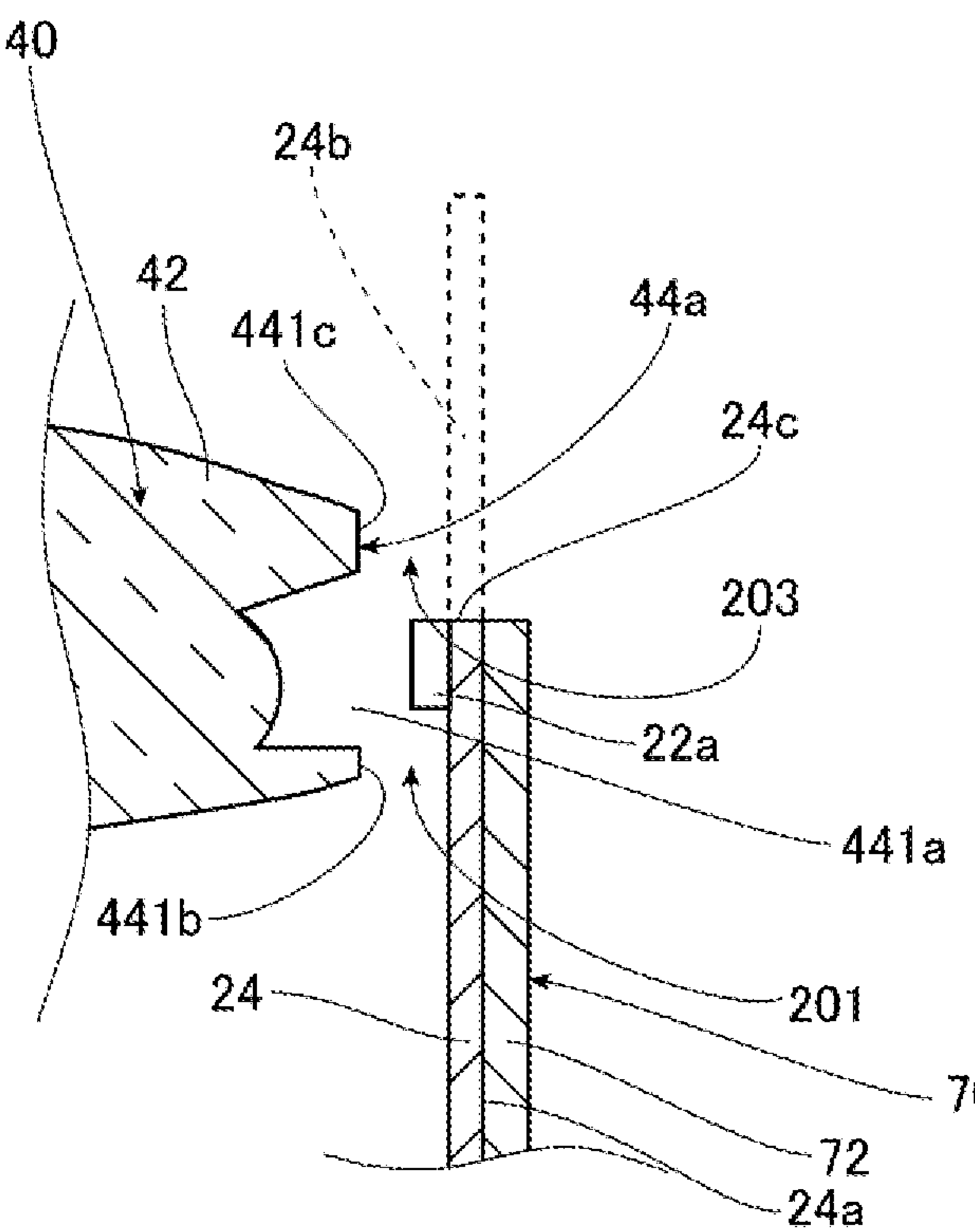

40
70
24b
72a
42
441c
72
44a
24c
203
22a
441a
441b
201
24
24a

FIG. 8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24b
42
441c
44a
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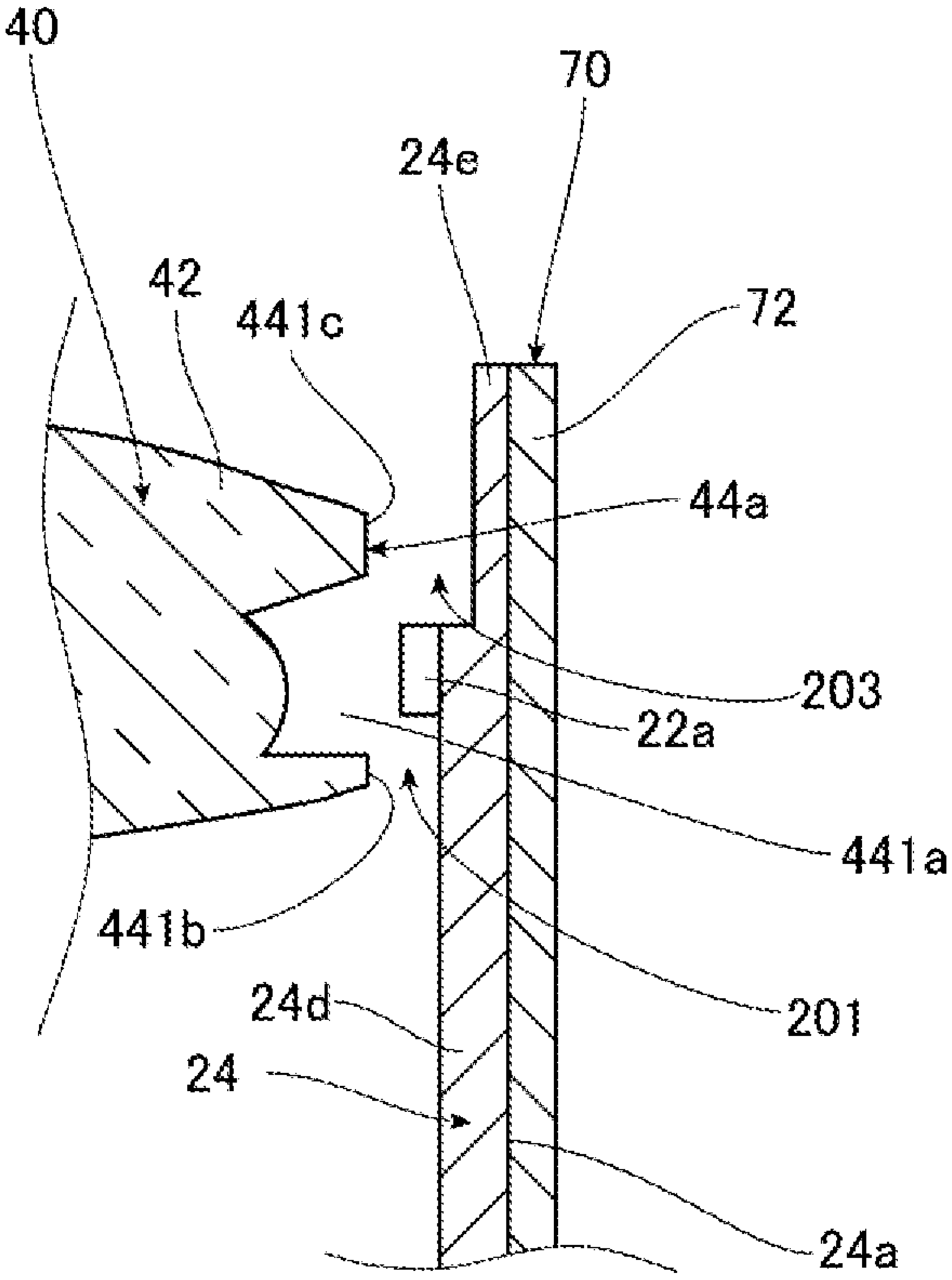
203
22a
441a
441b
201
24
70
72
24a

FIG. 9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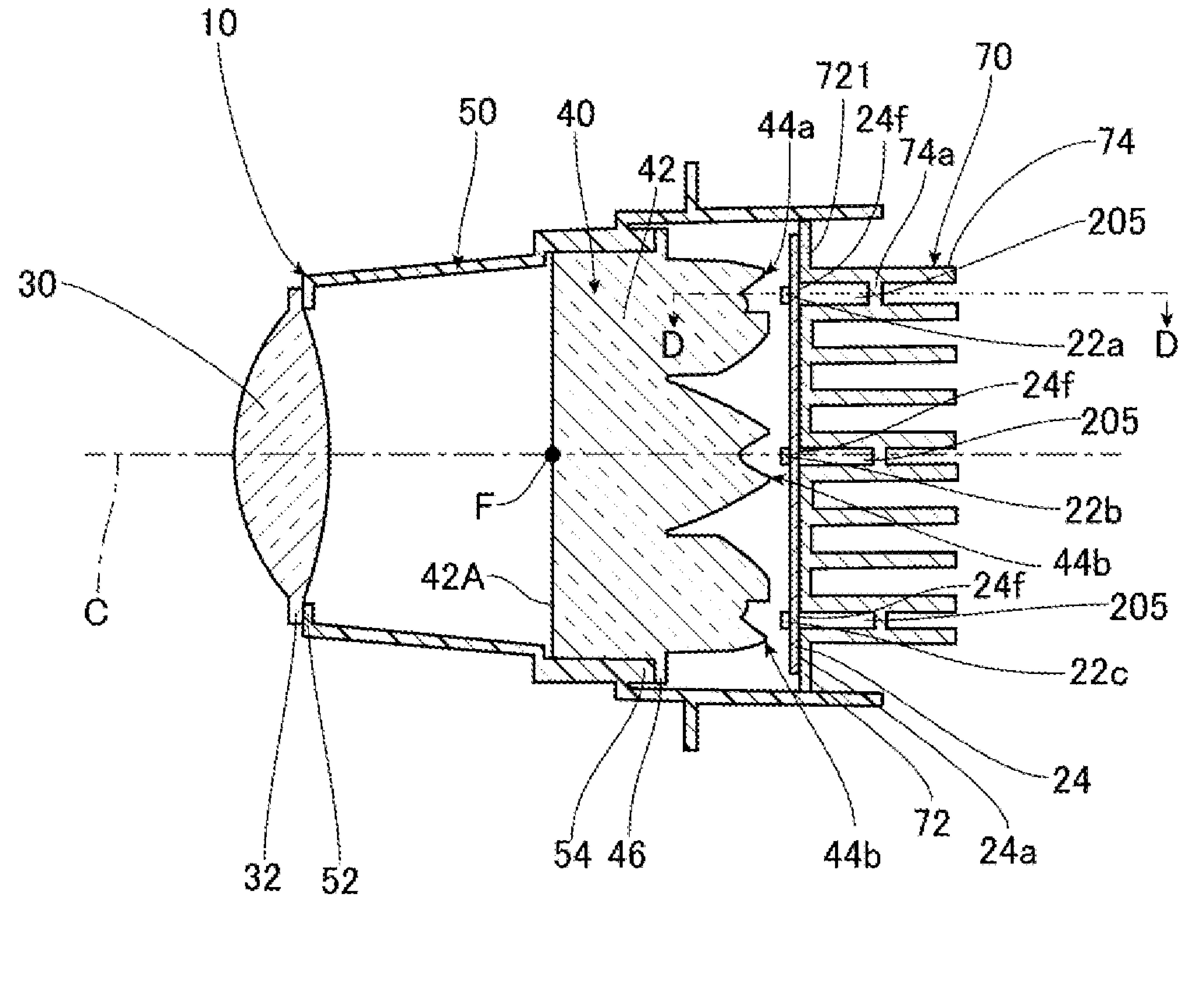
44a
203
22a
441a
441b
201
24d
24
24a

FIG. 10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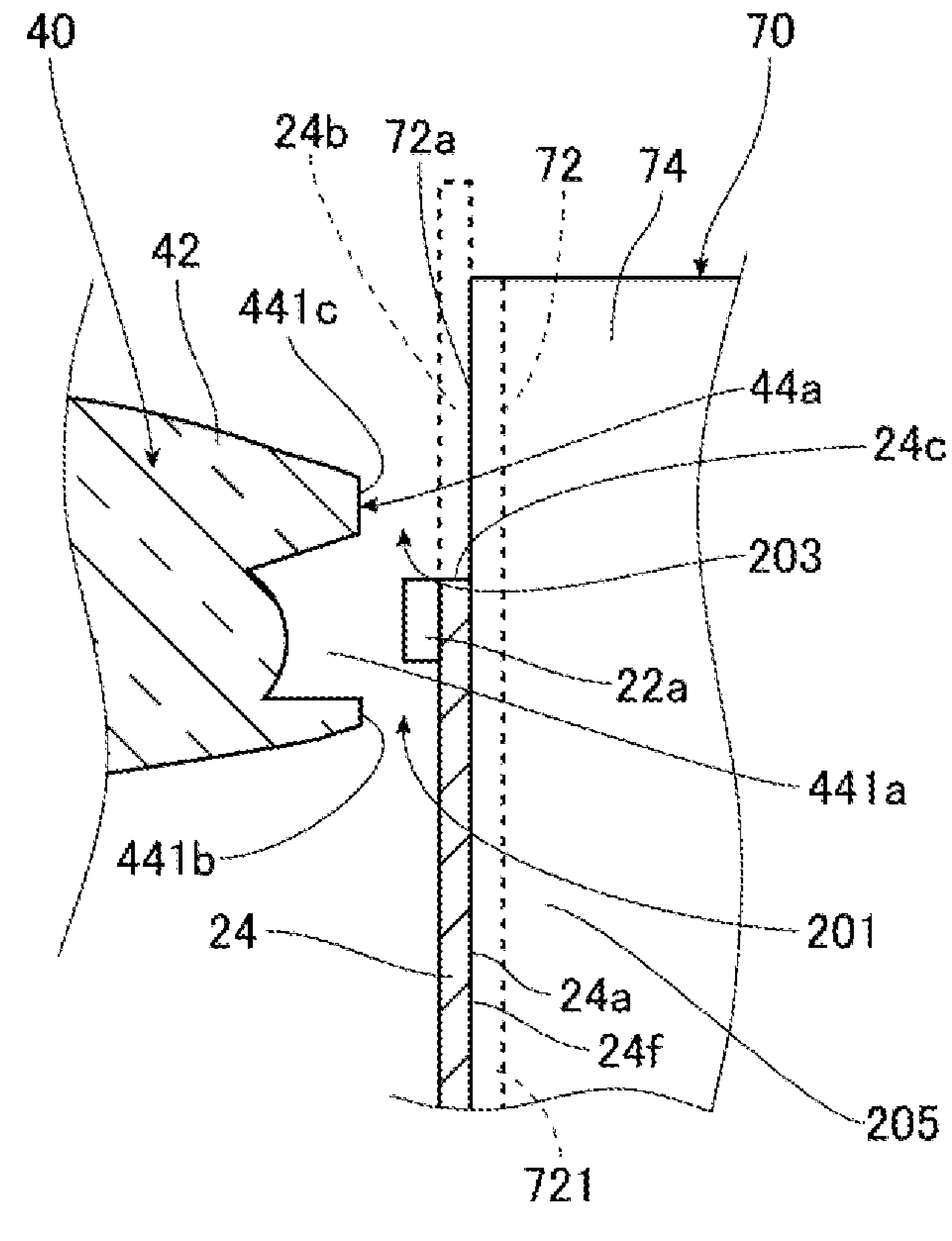
721
70
50
40
44a
24f
74a
74
42
205
30
22a
D
D
24f
205
F
22b
44b
42A
24f
205
C
22c
24
72
24a
32
52
54
46
44b

FIG. 11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72a
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22a
441a
441b
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24
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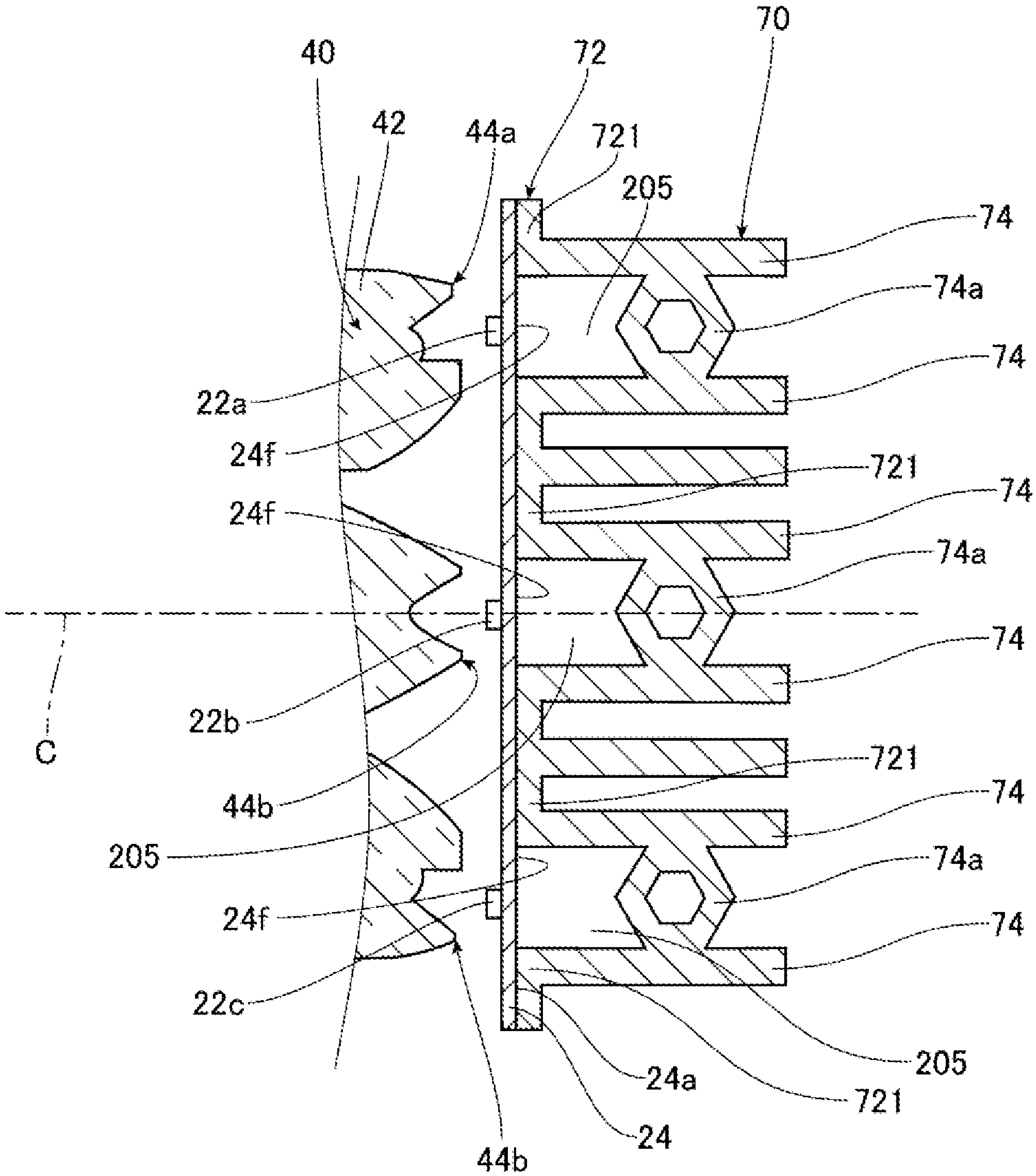
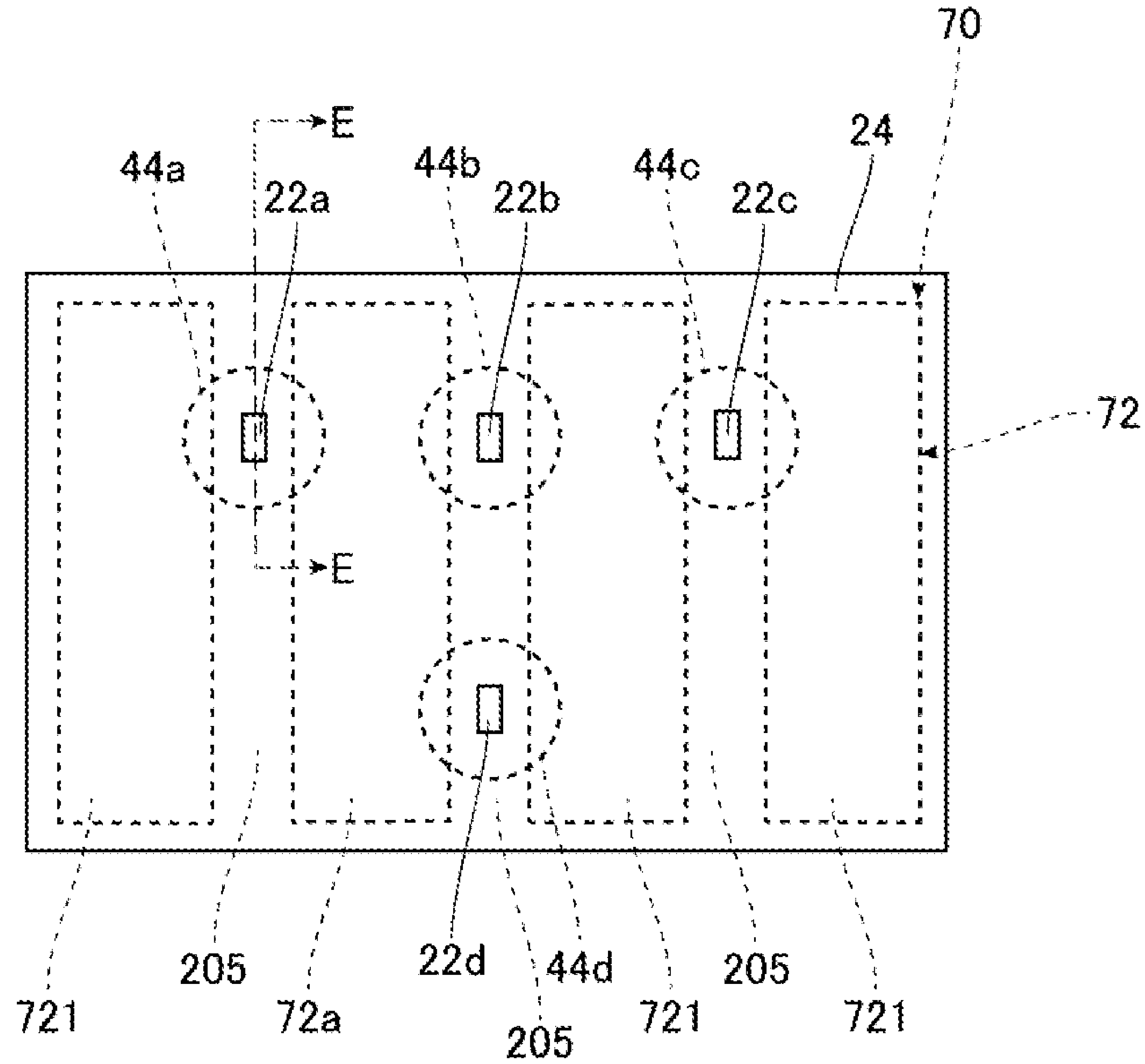
24f
205
721

FIG. 12



40
42
44a
72
721
205
70
74
74a
74
22a
24f
721
74
24f
74a
74
C
22b
44b
721
205
74
74a
24f
74
22c
24a
205
721
24
44b

FIG. 13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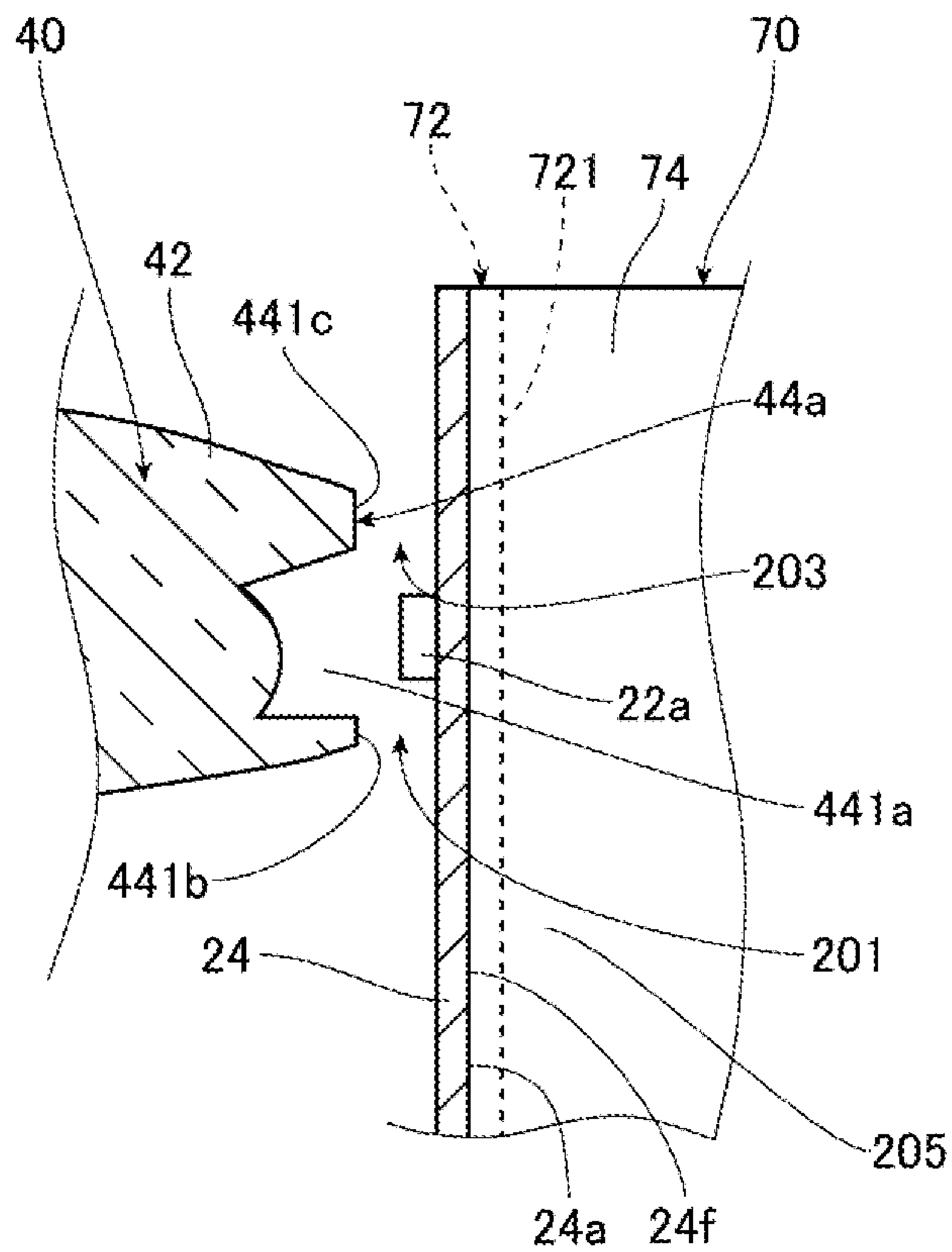
E
44a
22a
44b
22b
44c
22c
24
72
E
721
205
72a
22d
44d
205
721
205
721

FIG. 14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24
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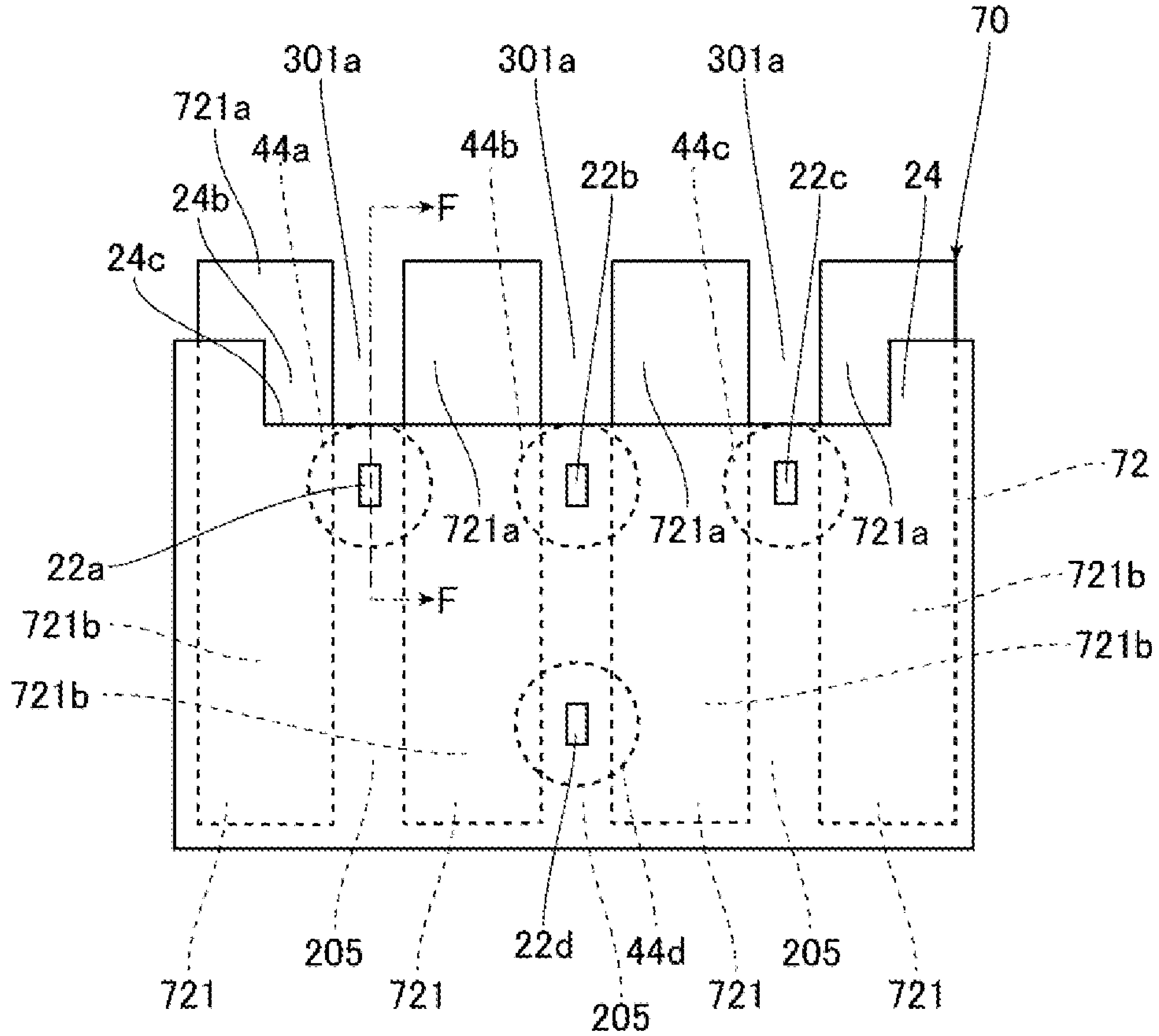
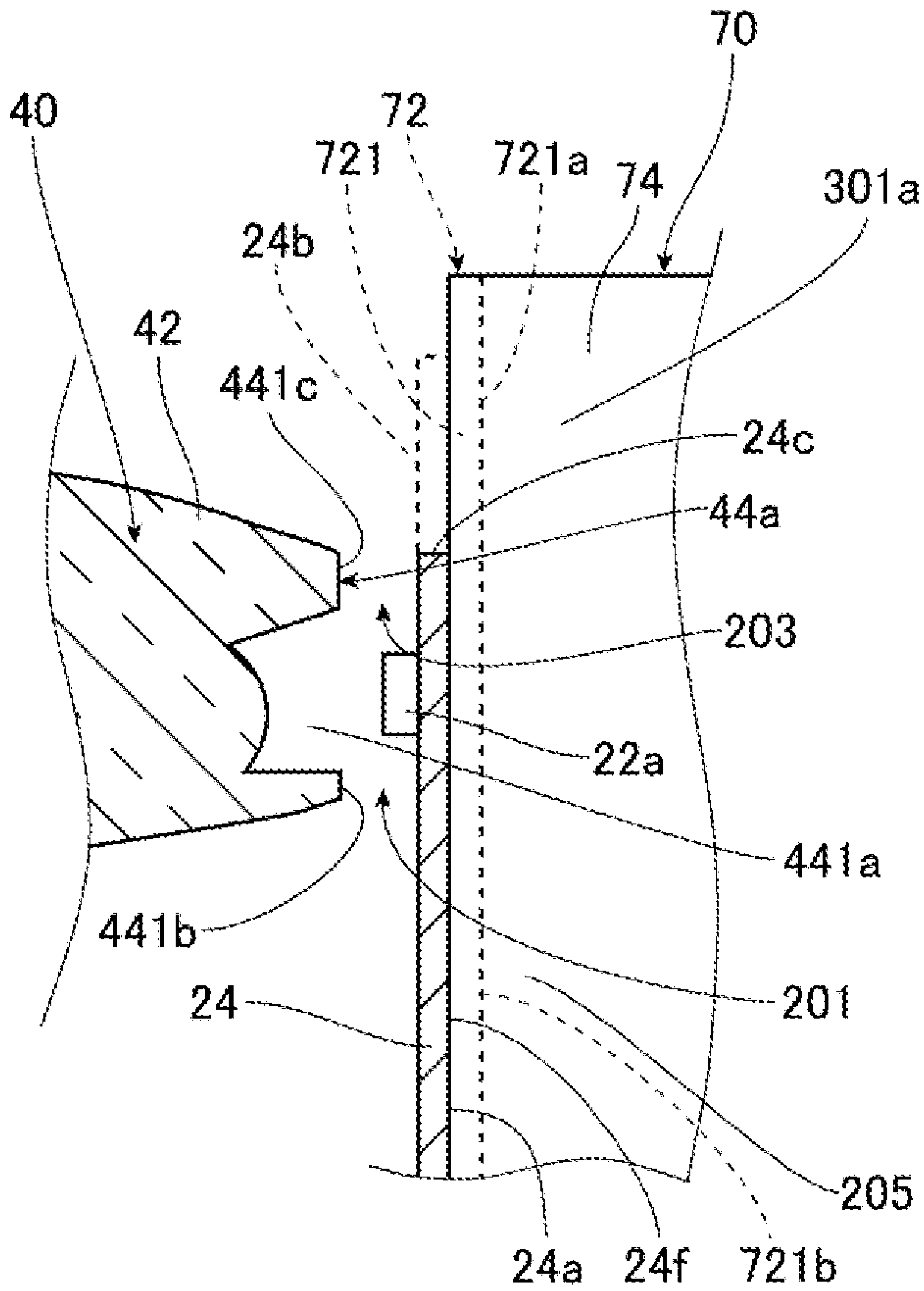
24a
24f

FIG. 15



70
301a
301a
301a
721a
44a
44b
22b
44c
22c
24
24b
F
24c
72
22a
721a
721a
721a
F
721b
721b
721b
721b
721
205
721
22d
44d
205
721
205
721

FIG. 16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44a
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22a
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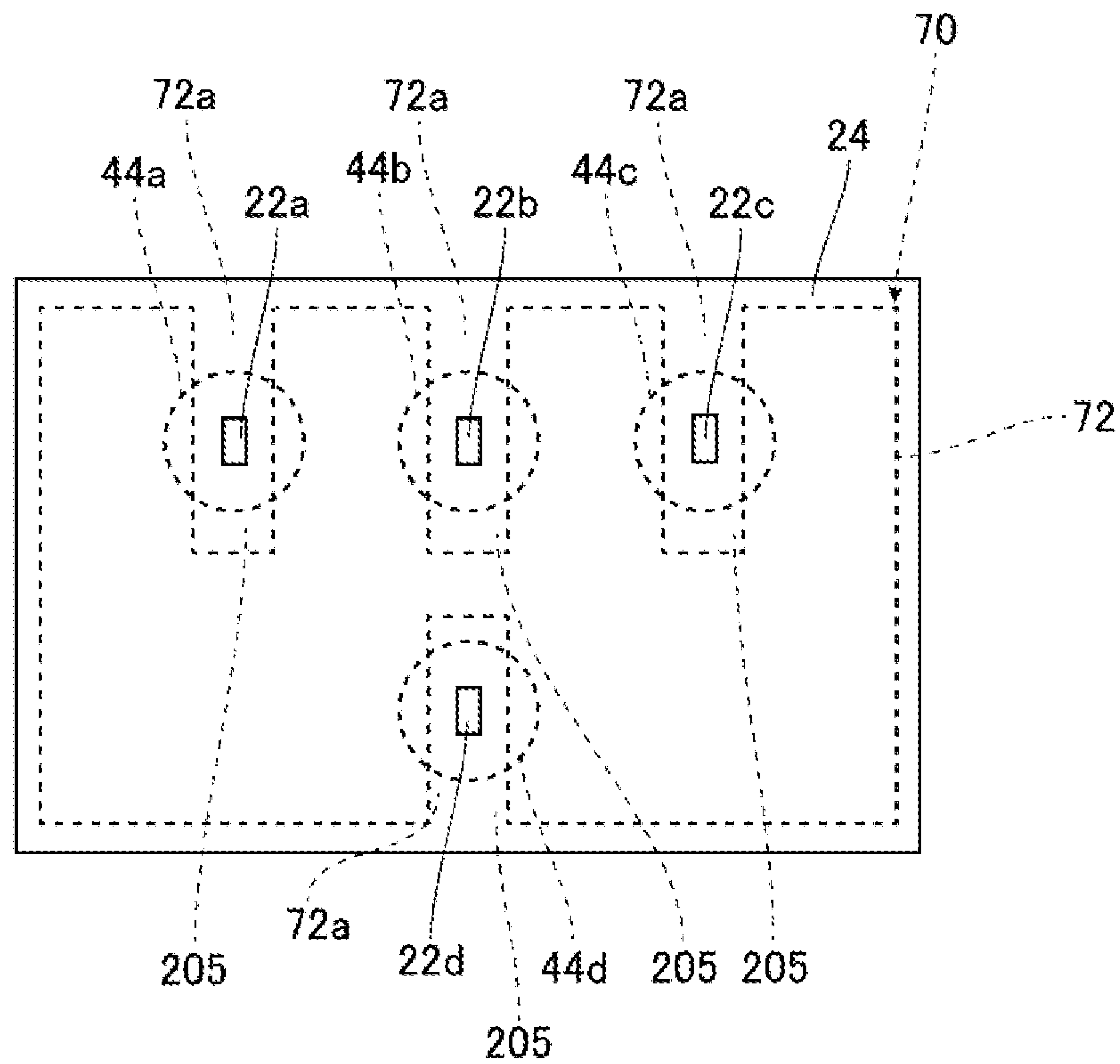
24f
721b

FIG. 17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72a
24
44a
22a
44b
22b
44c
22c
72
72a
205
22d
44d
205
205
205

VEHICULAR LAMP

CROSS REFERENCE TO RELATED APPLICATIONS

This application is a National Stage of International Application No. PCT/JP2022/026639 filed Jul. 4, 2022, claiming priorities based on Japanese Patent Application No. 2021-113184 filed Jul. 7, 2021 and on Japanese Patent Application No. 2021-113185 filed Jul. 7, 2021.

TECHNICAL FIELD

The present invention relates to a vehicular lamp.

BACKGROUND ART

A vehicular lamp that emits light from a light source forwards through a projection lens is known, and Patent Literatures 1 and 2 disclose such a vehicular lamp. A vehicular lamp disclosed in Patent Literature 1 includes a light guidance body disposed between a light source and a projection lens. Light emitted from the light source is incident on the light guidance body, and the light guidance body emits the light toward the projection lens.

A vehicular lamp disclosed in Patent Literature 2 includes a light source, a substrate having the light source mounted on the front surface thereof, and a heat sink including a base plate disposed on the back surface of the substrate and a plurality of heat radiation fins disposed in parallel on the base plate. Heat generated by driving the light source and supplied from the light source is transferred to the base plate through the substrate, and each of the heat radiation fins radiates the heat.

[Patent Literature 1] JP 2017-199660 A

[Patent Literature 2] JP 2021-012907 A

SUMMARY OF INVENTION

A vehicular lamp according to a first aspect of the present invention includes: a substrate; a light source mounted on the substrate; a projection lens disposed in front of the light source; and a light guidance body having an incident surface on which light from the light source is incident, the light guidance body being disposed between the light source and the projection lens and emitting the light toward the projection lens. A first space and a second space are provided on a side closer to the light source than to the incident surface, in which the first space is provided between a first region and the substrate, the first region including, on the incident surface, a part of an outer peripheral edge of the incident surface, and the second space communicates with the first space and is in contact with a second region including, on the incident surface, the other part of the outer peripheral edge of the incident surface. A width of the second space is wider than a width of the first space in an emission direction of the light from the light source.

In the vehicular lamp according to the first aspect, since the width of the second space is wider than the width of the first space, gas can easily flow through the second space as compared with a case in which the width of the second space is the same as the width of the first space. When the gas easily flows, heat is hardly accumulated between the light source and the incident surface and, as such, deformation of the light guidance body due to heat can be suppressed. When the deformation is suppressed, the light traveling inside the light guidance body and the light traveling from the light guidance body to the projection lens can be suppressed from traveling in an unintended direction, thereby making it possible to suppress a change in a light distribution pattern to an unintended shape.

Further, in the vehicular lamp according to the first aspect, the substrate may not be disposed on a side opposite to the second region with the second space interposed between the side and the second region.

In addition, the vehicular lamp according to the first aspect may further include a heat sink including a base plate disposed on a back surface of the substrate, in which the base plate may include a non-overlapping part that does not overlap the substrate, and the second space may be provided between the second region of the incident surface and the non-overlapping part.

According to this configuration, heat between the light source and the incident surface is more easily transferred from the second space to the base plate in contact with the second space than a case in which the second space is not in contact with the base plate. Therefore, deformation of the light guidance body due to heat can be suppressed in the second region.

Further, in the vehicular lamp according to the first aspect, the substrate may include a main body part including a region facing the first region of the incident surface, and an extension part facing the second region of the incident surface and being thinner than the main body part, and the second space may be provided between the second region of the incident surface and the extension part.

According to this configuration, the substrate can be widened as compared with a case in which the extension part is not provided.

In addition, when the substrate is viewed from the front, a boundary between the first space and the second space may overlap a recessed part provided in the incident surface.

Further, in the vehicular lamp according to the first aspect, the substrate may be disposed non-horizontally, and the second space may be provided above the first space.

Gas warmed by the heat between the light source and the incident surface rises. When the second space is provided above the first space, the warmed gas flows from the first space to the second space, the width of which is wider than that of the first space. In this case, the gas can easily flow as compared with a case in which the first space, the width of which is narrower than that of the second space, is provided above the second space, thereby making it possible to suppress heat from being accumulated between the light source and the incident surface in natural air cooling.

The vehicular lamp according to the first aspect may further include a heat sink including a base plate disposed on a back surface of the substrate and a plurality of heat radiation fins disposed in parallel with an interval therebetween on a surface of the base plate, in which the surface is located on a side opposite to a side facing the substrate. The substrate may be made of metal, and the heat sink may be provided with a third space in contact with an exposed region, the base plate, and the heat radiation fins adjacent to each other, in which the exposed region is exposed from the base plate in at least a part of the back surface, in which the part is located between the heat radiation fins adjacent to each other.

In the vehicular lamp, the substrate is made of metal, and the thermal conductivity of metal is higher than the thermal conductivity of resin as compared with a case in which the substrate is made of resin, so that the heat from the light source can be easily transferred to the base plate via the substrate. Since the heat transferred to the base plate is radiated from the heat radiation fin, the substrate can be easily cooled. In addition, in the vehicular lamp, since the exposed region is in contact with the third space, heat is also directly radiated from the exposed region which is a part of the metal substrate. In this case, the substrate can be easily cooled as compared with a case in which heat is not directly radiated from the substrate. When the substrate is cooled in this manner, the heat from the light source can be easily transferred to the substrate and, as such, cooling efficiency of the light source can be improved.

In the vehicular lamp according to the first aspect, the third space may merge with the second space.

In this configuration, when gas flows from the third space to the second space and the gas flowing through the third space is faster than the gas flowing through the second space, the gas flowing through the second space is drawn by the gas merging with the second space from the third space and the speed of the gas flowing through the second space increases. Therefore, the light guidance body can be cooled. Conversely, when the gas flowing through the second space is faster than the gas flowing through the third space, the gas flowing through the third space is drawn by the gas flowing through the second space, and the speed of the gas flowing through the third space increases. Therefore, the heat sink can be cooled.

Further, in the vehicular lamp according to the first aspect, at least a part of the third space may overlap the light source when the substrate is viewed from the front.

In this case, as compared with a case in which the third space does not overlap the light source, the heat from the light source can be easily transferred to the gas flowing through the third space via the substrate.

A vehicular lamp according to a second aspect of the present invention includes: a metal substrate; a light source mounted on a front surface of the substrate; and a heat sink disposed on a back surface of the substrate. The heat sink includes a base plate disposed on the back surface, and a plurality of heat radiation fins disposed in parallel with an interval therebetween on a surface of the base plate, in which the surface is located on a side opposite to a side facing the substrate. The heat sink is provided with a heat sink side space in contact with an exposed region, the base plate, and the heat radiation fins adjacent to each other, in which the exposed region is exposed from the base plate in at least a part of the back surface, in which the part is located between the heat radiation fins adjacent to each other.

In the vehicular lamp according to the second aspect, the substrate is made of metal. In this case, since the thermal conductivity of metal is higher than the thermal conductivity of resin as compared with a case in which the substrate is made of resin, heat from the light source can be easily transferred to the base plate via the substrate. Since the heat transferred to the base plate is radiated from the heat radiation fin, the substrate can be easily cooled. In addition, in the vehicular lamp, since the exposed region is in contact with the heat sink side space, heat is also directly radiated from the exposed region which is a part of the metal substrate. In this case, the substrate can be easily cooled as compared with a case in which heat is not directly radiated from the substrate. When the substrate is cooled in this manner, the heat from the light source can be easily transferred to the substrate and, as such, cooling efficiency of the light source can be improved.

Further, in the vehicular lamp according to the second aspect, the heat sink side space may overlap at least a part of the light source when the substrate is viewed from the front.

According to this configuration, as compared with a case in which the heat sink side space does not overlap the light source, a region of the substrate, the region overlapping the light source, can be easily cooled by gas flowing through the heat sink side space. When the region is cooled, cooling efficiency of the light source can be improved.

Further, in the vehicular lamp according to the second aspect, a width of the heat sink side space may be wider than a width of the light source when the substrate is viewed from the front.

According to this configuration, when the width of the heat sink side space is widened, the width of the exposed region is widened, heat is easily transferred from the exposed region to the heat sink side space, and the substrate is easily cooled. Further, when the width of the heat sink side space is widened, gas can easily flow through the heat sink side space. When the gas easily flows, heat is hardly accumulated in the heat sink side space and, as such, the substrate is easily cooled. When the substrate is cooled in this manner, cooling efficiency of the light source can be improved. Furthermore, in this configuration, a region of the substrate around the light source can be cooled, and when the region is cooled, the heat from the light source is diffused to the region, so that the cooling efficiency of the light source can be further improved.

Further, in the vehicular lamp according to the second aspect, the base plate may include a plurality of base plate pieces disposed side by side with an interval therebetween on the back surface, the heat radiation fin may be disposed on each of the base plate pieces adjacent to each other, and the exposed region may be exposed between the base plate pieces adjacent to each other.

In the vehicular lamp according to the second aspect, the heat radiation fins, each of which is provided in a corresponding one of the base plate pieces adjacent to each other, may be connected to each other.

According to this configuration, the base plate pieces adjacent to each other via the heat radiation fins connected to each other are formed as one unit. In this case, the number of attachment steps of the heat sink can be reduced as compared with a case in which the heat radiation fins are not connected to each other.

The vehicular lamp according to the second aspect may further include a light guidance body having an incident surface on which light from the light source is incident, in which the light guidance body is disposed in front of the light source and guides the light. The heat sink side space may overlap at least a part of the incident surface when the substrate is viewed from the front.

As described above, when the substrate is cooled, the heat from the light source is easily transferred to the substrate. Therefore, when the heat sink side space overlaps at least a part of the incident surface, heat from the light source is less likely to be transferred to the incident surface and, as such, heat is less likely to be accumulated between the light source and the incident surface, as compared with a case in which the heat sink side space does not overlap the incident surface. As a result, deformation of the light guidance body including the incident surface due to the heat can be suppressed. When the deformation of the light guidance body is suppressed, the light traveling inside the light guidance body and the light emitted from the light guidance body can be suppressed from traveling in an unintended direction, thereby making it possible to suppress a change in a light distribution pattern to an unintended shape.

In the vehicular lamp according to the second aspect, the base plate may include a non-overlapping part that does not overlap the substrate and an overlapping part that overlaps the substrate, and the heat sink side space may extend to an edge of the substrate, in which the edge overlaps a boundary between the non-overlapping part and the overlapping part when the substrate is viewed from the front.

When the heat sink side space extends in this manner, the heat sink side space is opened on the non-overlapping part side. When the gas flowing through the heat sink side space and the gas flowing between the light source and the incident surface merge via the opening of the heat sink side space, and the gas flowing through the heat sink side space is faster than the gas flowing between the light source and the incident surface, the gas flowing between the light source and the incident surface is drawn by the gas flowing through the heat sink side space, and the speed of the gas flowing between the light source and the incident surface increases. Therefore, the light guidance body can be cooled. Conversely, when the gas flowing between the light source and the incident surface is faster than the gas flowing through the heat sink side space, the gas flowing through the heat sink side space is drawn by the gas flowing between the light source and the incident surface, and the speed of the gas flowing through the heat sink side space increases. Therefore, the heat sink can be cooled.

BRIEF DESCRIPTION OF DRAWINGS

FIG. **1** is a cross-sectional view illustrating a schematic configuration example of a vehicular lamp according to a first embodiment of the present invention.

FIG. **2** is a cross-sectional view taken along line A-A illustrated in FIG. **1**.

FIG. **3** is a cross-sectional view taken along line B-B illustrated in FIG. **1**.

FIG. **4** is an exploded perspective view of a light guidance body, a substrate, and a heat sink when viewed obliquely from the front.

FIG. **5** is an exploded perspective view of the light guidance body, the substrate, and the heat sink when viewed diagonally from the rear.

FIG. **6** is a front view of the substrate.

FIG. **7** is a cross-sectional view taken along line C-C illustrated in FIG. **6**.

FIG. **8** is a diagram illustrating a first modification of a second space.

FIG. **9** is a diagram illustrating a second modification of the second space.

FIG. **10** is a diagram illustrating a modification of the heat sink.

FIG. **11** is a cross-sectional view taken along line D-D illustrated in FIG. **10**.

FIG. **12** is an enlarged view of the periphery of a base plate according to a second embodiment of the present invention.

FIG. **13** is a front view of the substrate.

FIG. **14** is a cross-sectional view taken along line E-E illustrated in FIG. **13**.

FIG. **15** is a front view of a substrate according to a first modification of the second embodiment.

FIG. **16** is a cross-sectional view taken along line F-F illustrated in FIG. **15**.

FIG. **17** is a front view of a substrate according to a second modification of the second embodiment.

DESCRIPTION OF EMBODIMENTS

Hereinafter, a preferred embodiment of a vehicular lamp according to the present invention will be described in detail with reference to the drawings. The embodiments exemplified below are intended to facilitate understanding of the present invention and are not intended to limit the present invention. The present invention can be modified and improved without departing from the gist thereof. In addition, in the present invention, components described in the following exemplary embodiments may be appropriately combined. It is noted that, in the drawings referred to below, dimensions of each member may be changed for easy understanding.

First Embodiment

A first embodiment of the present invention will be described. FIG. **1** is a cross-sectional view illustrating a schematic configuration example of a vehicular lamp of the present embodiment. FIG. **2** is a cross-sectional view taken along line A-A illustrated in FIG. **1**, and FIG. **3** is a cross-sectional view taken along line B-B illustrated in FIG. **1**.

A vehicular lamp **100** is used as a headlight provided at a front end portion of a vehicle. The headlight is generally provided in each of the left and right directions on the front of the vehicle. In the present specification, "right" means the right side in the traveling direction of the vehicle, and "left" means the left side in the traveling direction of the vehicle. Each of the left and right headlights has the same configuration except that the shape is substantially symmetrical in the left-and-right direction. Therefore, in the present embodiment, one headlight will be described.

The vehicular lamp **100** of the present embodiment mainly includes a housing **101** and a projector type lamp unit **10** housed in the housing **101**. The housing **101** includes a lamp body **102** made of resin and a translucent cover **104** through which light from the lamp unit **10** passes. The translucent cover **104** is fixed to the lamp body **102** so as to close a front opening of the lamp body **102**. The lamp unit **10** is accommodated in a lamp chamber formed by the lamp body **102** and the translucent cover **104** in a state in which the optical axis thereof is adjusted such that the forward-and-rearward direction of the lamp unit **10** substantially coincides with the forward-and-rearward direction of the vehicle. It is noted that, in FIGS. **2** and **3**, illustration of the housing **101** is omitted.

The lamp unit **10** mainly includes light sources **22***a*, **22***b*, **22***c*, and **22***d*, a common substrate **24** having the light sources **22***a*, **22***b*, **22***c*, and **22***d* mounted on the front surface thereof, a light guidance body **40**, a projection lens **30**, and a heat sink **70**. The lamp unit **10** emits light from the light sources **22***a*, **22***b*, **22***c*, and **22***d* toward the front of the lamp unit **10** via the light guidance body **40** and the projection lens **30**.

The substrate **24** is made of metal, and an example of the metal includes aluminum. The substrate **24** is supported by a lens holder **50** in a state of being disposed so as to extend along a vertical plane orthogonal to an optical axis C of the projection lens **30**. The optical axis C is an axis extending in the forward-and-rearward direction of the lamp unit **10**.

FIG. **4** is an exploded perspective view of the light guidance body **40**, the substrate **24**, and the heat sink **70** when viewed obliquely from the front, and FIG. **5** is an exploded perspective view of the light guidance body **40**, the substrate **24**, and the heat sink **70** when viewed obliquely from the rear. In the lamp unit **10** of the present embodiment, the light source **22***a* is disposed on the right side of the light source **22***b* with an interval therebetween, the light source **22***c* is disposed on the left side of the light source **22***b* with an interval therebetween, the light source **22***b* is disposed above the optical axis C of the projection lens **30**, and the light source **22***d* is disposed below the optical axis C. Each of the light sources **22***a*, **22***b*, **22***c*, and **22***d* is a phosphor type light emitting diode (LED) that emits white light, and is disposed in a state in which each vertically long rectangular light emission surface thereof faces forwards.

The four light sources **22***a*, **22***b*, **22***c*, and **22***d* are electrically connected to a connector (not illustrated) via a conductive pattern (not illustrated) provided on the substrate **24**. The connector is provided at a lower end center portion of the front surface of the substrate **24**, and when a power supply side connector (not illustrated) is attached to the connector, power is supplied to each of the light sources **22***a*, **22***b*, **22***c*, and **22***d*. As a result, the light sources **22***a*, **22***b*, **22***c*, and **22***d* are turned on. Among the four light sources **22***a*, **22***b*, **22***c*, and **22***d*, the three light sources **22***a*, **22***b*, and **22***c* are turned on when a low beam light distribution pattern is formed, and the remaining one light source **22***d* is additionally turned on when a high beam light distribution pattern is formed.

Referring back to FIGS. **1**, **2**, and **3**, the description will be continued. The heat sink **70** radiates heat generated from the light sources **22***a*, **22***b*, **22***c*, and **22***d* and transferred from the substrate **24**. The heat sink **70** is made of metal, and an example of the metal includes aluminum. The heat sink **70** is disposed on a back surface **24***a* of the substrate **24**.

The heat sink **70** mainly includes a base plate **72** formed to extend along a vertical plane orthogonal to the optical axis C of the projection lens **30**, and a plurality of heat radiation fins **74** formed to extend rearwards from the base plate **72** along the vertical plane. The base plate **72** is disposed on the back surface **24***a* of the substrate **24**, and the heat radiation fins **74** are disposed in parallel with an interval therebetween in the horizontal direction on a surface of the base plate **72**, in which the surface is located on a side opposite to a side facing the back surface **24***a*. The heat sink **70** is supported by the lens holder **50** together with the substrate **24** in a state of being in surface contact with the back surface **24***a* of the substrate **24** on the front surface of the base plate **72**. The substrate **24** and the heat sink **70** are supported by the lens holder **50** by mechanical coupling. Specifically, the substrate **24** and the heat sink **70** are fixed to the lens holder **50** by being screwed to the lens holder **50** at two left and right positions. The heat radiation fins **74** are disposed in parallel with an interval therebetween on a surface of the base plate **72**, in which the surface is located on a side opposite to a side facing the substrate **24**.

The projection lens **30** is disposed in front of the light sources **22***a*, **22***b*, **22***c*, and **22***d*, light emitted from each of the light sources is incident thereon, and a divergence angle of the light incident on the projection lens **30** is adjusted. In the projection lens **30**, the incident surface is formed in a convex shape toward the rear, the emission surface is formed in a convex shape toward the front, and the projection lens **30** is a biconvex aspherical lens. A rear focal point F of the projection lens **30** is located in the vicinity of or on a first emission surface **42**A (described later) of the light guidance body **40**. The light, the divergence angle of which is adjusted by the projection lens **30**, is emitted from the vehicular lamp **100** toward the front of the vehicle via the translucent cover **104**.

The projection lens **30** is made of resin such as colorless and transparent acrylic. The projection lens **30** is supported by the lens holder **50** at an outer peripheral flange part **32** of the projection lens **30**.

The lens holder **50** is a cylindrical member formed to extend in the forward-and-rearward direction of the lamp unit **10**, and is made of resin such as opaque polycarbonate. An annular lens support part **52** to which the outer peripheral flange part **32** of the projection lens **30** is fixed is provided at the front end portion of the lens holder **50**. The projection lens **30** is fixed to the lens holder **50** by, for example, laser welding in a state in which the outer peripheral flange part **32** is pressed against the lens support part **52** from the front side. In addition, the lens support part **52** is provided with a pair of upper and lower positioning pins (not illustrated), and each of the outer peripheral flange parts **32** of the projection lens **30** is provided with a positioning hole (not illustrated) and a positioning groove (not illustrated) so as to face a corresponding one of the upper and lower positioning pins. When the upper positioning pin is engaged with the positioning hole and the lower positioning pin is engaged with the positioning groove, the projection lens **30** is positioned with respect to the lens holder **50** in a direction orthogonal to the forward-and-rearward direction of the lamp unit **10**.

The light guidance body **40** is disposed between the projection lens **30** and the light sources **22***a*, **22***b*, **22***c*, and **22***d*. The light guidance body **40** is, for example, a primary lens, and guides light from each of the light sources **22***a*, **22***b*, **22***c*, and **22***d* so that the light enters the projection lens **30**. The light guidance body **40** is made of a colorless and transparent resin such as polycarbonate.

As illustrated in FIGS. **1**, **2**, **3**, and **4**, the light guidance body **40** includes the first emission surface **42**A that emits light forming a low beam light distribution pattern and a second emission surface **42**B that emits light forming an additional light distribution pattern. The additional light distribution pattern is a light distribution pattern added to the low beam light distribution pattern when the high beam light distribution pattern is formed.

The first emission surface **42**A is located at an upper portion of the front surface of the light guidance body **40**, and is formed to extend along the rear focal plane of the projection lens **30**. As illustrated in FIG. **4**, the first emission surface **42**A has a horizontally long rectangular outer shape in which left and right upper corner portions thereof are chamfered. A lower end edge **42**Aa of the first emission surface **42**A extends in the horizontal direction in a laterally different manner so as to pass through the vicinity above the rear focal point F of the projection lens **30**.

The second emission surface **42**B is located at a lower portion of the front surface of the light guidance body **40**. In addition, the second emission surface **42**B extends along a plane slightly inclined rearwards with respect to a vertical plane orthogonal to the optical axis C of the projection lens **30** at a position spaced apart from the rear focal plane of the projection lens **30** toward the rear side of the lamp unit **10** by a certain amount. The second emission surface **42**B has a substantially oblong elliptical outer shape with a cut-out upper portion. Most of the second emission surface **42**B is located below the optical axis C.

The light guidance body **40** includes a block part **42** formed to extend rearwards while substantially maintaining the outer shape of the first emission surface **42**A. The lower surface of the block part **42** is formed as a connection surface **42**C formed to extend in the horizontal direction rearwards from the lower end edge **42**Aa of the first emission surface **42**A to an upper end edge **42**Ba of the second emission surface **42**B.

The light guidance body **40** includes four incident surfaces **44***a*, **44***b*, **44***c*, and **44***d*, in which light from each of the four light sources **22***a*, **22***b*, **22***c*, and **22***d* is incident on a corresponding one of the incident surfaces **44***a*, **44***b*, **44***c*, and **44***d*. Similarly to the arrangement of the light sources **22***a*, **22***b*, **22***c*, and **22***d*, the incident surface **44***a* is located on the right side of the incident surface **44***b* with an interval therebetween, the incident surface **44***c* is located on the left side of the incident surface **44***b* with an interval therebetween, the incident surface **44***b* is located above the optical axis C of the projection lens **30**, and the incident surface **44***d* is located below the optical axis C. The incident surfaces **44***a*, **44***b*, and **44***c* are located on the front side with respect to the respective three light sources **22***a*, **22***b*, and **22***c*, and are located on the rear side with respect to the block part **42**. The incident surface **44***d* is located on the front side with respect to the light source **22***d*, and is located on the rear side with respect to the second emission surface **42**B.

The block part **42** guides the light incident from each of the incident surfaces **44***a*, **44***b*, and **44***c* to the first emission surface **42**A directly or after totally reflecting the light. Further, the block part **42** totally reflects, on the connection surface **42**C, light reaching the connection surface **42**C and then guides the light to the first emission surface **42**A. A portion of the light guidance body **40** excluding the block part **42** guides the light from the incident surface **44***d* to the second emission surface **42**B directly or after totally reflecting the light.

As illustrated in FIG. **2**, in the light guidance body **40**, an outer peripheral flange part **46** is provided at an upper portion of a rear end portion of the block part **42** and both left and right side portions thereof. The outer peripheral flange part **46** extends along a vertical plane orthogonal to the optical axis C. The light guidance body **40** is supported by the lens holder **50** at the outer peripheral flange part **46** in a state of being accommodated in the internal space of the lens holder **50**.

The lens holder **50** is provided with a light transmission body supporting part **54** formed to extend along the outer peripheral flange part **46** of the light guidance body **40**. The light guidance body **40** is fixed to the lens holder **50** by, for example, laser welding in a state in which the outer peripheral flange part **46** is pressed against the rear surface of the light transmission body supporting part **54** from the rear side. In addition, a pair of left and right positioning pins (not illustrated) is provided in the light transmission body supporting part **54**, and a pair of left and right positioning holes is provided in the outer peripheral flange part **46**. When the positioning pin is engaged with the positioning hole, the light guidance body **40** is positioned in the direction orthogonal to the unit forward-and-rearward direction with respect to the lens holder **50**.

FIG. **6** is a front view of the substrate **24**. In FIG. **6**, a portion of the base plate **72**, the portion overlapping the substrate **24**, and the incident surfaces **44***a*, **44***b*, **44***c*, and **44***d* are indicated by broken lines. When the substrate **24** is viewed from the front, the light sources **22***a*, **22***b*, **22***c*, and **22***d* are respectively located inside the outer peripheral edges of the incident surfaces **44***a*, **44***b*, **44***c*, and **44***d*.

A part of the substrate **24** is cut out, and the substrate **24** is provided with a slit-shaped opening **24***b*. The opening **24***b* is elongated in the horizontal direction in which the three light sources **22***a*, **22***b*, and **22***c* are arranged, and the opening is longer than a space between the light source **22***a* and the light source **22***c*. The opening **24***b* is provided on the opposite side of the light source **22***d* with respect to the three light sources **22***a*, **22***b*, and **22***c*. In a case where the substrate **24** is viewed from the front, the upper end edge of each of the light sources **22***a*, **22***b*, and **22***c* overlaps an edge **24***c* of the substrate **24**, in which the edge **24***c* is in contact with the lower end edge of the opening **24***b*. The opening **24***b* allows the base plate **72** to have a non-overlapping part **72***a* that does not overlap the substrate **24**. The non-overlapping part **72***a* is a portion of the base plate **72**, in which the portion is exposed from the substrate **24**.

FIG. **7** is a cross-sectional view taken along line C-C illustrated in FIG. **6**. In FIG. **7**, the opening **24***b* is indicated by a broken line.

A first space **201** and a second space **203** are provided between the light source **22***a* side and the incident surface **44***a* of the light guidance body **40** on which light from the light source **22***a* is incident. The first space **201** and the second space **203** are flow paths through which gas can flow. The first space **201** and the second space **203** are also respectively provided between the light source **22***b* side and the incident surface **44***b* of the light guidance body **40**, and between the light source **22***c* side and the incident surface **44***c* of the light guidance body **40**. Here, the first space **201** and the second space **203** have the same configuration. Therefore, a description will be given using the first space **201** and the second space **203** on the light source **22***a* side. In addition, the configurations of the incident surfaces **44***b* and **44***c* are the same as the configuration of the incident surface **44***a* described below.

The incident surface **44***a* is provided with a recessed part **441***a* recessed toward the projection lens **30**. The recessed part **441***a* faces the substrate **24**, the light source **22***a*, and the non-overlapping part **72***a*. Therefore, when the substrate **24** is viewed from the front, the recessed part **441***a* overlaps the substrate **24**, the edge **24***c* of the substrate **24**, the light source **22***a*, and the non-overlapping part **72***a*.

The incident surface **44***a* includes a first region **441***b* including a part of the outer peripheral edge of the incident surface **44***a* and a second region **441***c* including the other part of the outer peripheral edge of the incident surface **44***a*. The first region **441***b* is provided below the second region **441***c*. The first region **441***b* and the second region **441***c* are provided on the same plane outside the recessed part **441***a*, but may be provided on different planes. The first region **441***b* and the second region **441***c* are located closer to the projection lens **30** than to the light emission surface of the light source **22***a*.

The first region **441***b* faces the substrate **24**, and the first space **201** is provided between the first region **441***b* and the substrate **24**. Therefore, when the substrate **24** is viewed from the front, the first region **441***b* overlaps the first space **201** and the substrate **24**, and the substrate **24** is disposed on the side opposite to the first region **441***b* with the first space **201** interposed therebetween.

The second region **441***c* faces the non-overlapping part **72***a*, and the second space **203** is provided between the second region **441***c* and the non-overlapping part **72***a*. Therefore, when the substrate **24** is viewed from the front, the second region **441***c* overlaps the second space **203** and the non-overlapping part **72***a*, the substrate **24** is not disposed on the side opposite to the second region **441***c*, and the non-overlapping part **72***a* is disposed on the side opposite to the second region **441***c* with the second space **203** interposed therebetween. Further, the second space **203** is in contact with the base plate **72**.

The second space **203** is provided above the first space **201** and is configured to communicate with the first space **201** via the recessed part **441***a*. Therefore, the recessed part **441***a* is provided between the first space **201** and the second space **203**, and when the substrate **24** is viewed from the front, a boundary between the first space **201** and the second space **203** overlaps the recessed part **441***a*, but the boundary may not overlap the recessed part **441***a*. Since the non-overlapping part **72***a* is farther from the incident surface **44***a* than the substrate **24**, the second space **203** is wider than the first space **201** in the optical axis C direction which is the emission direction of the light from the light source **22***a*. In addition, the second space **203** is longer than the first space **201** in the vertical direction, and has a greater depth than that of the first space **201** in the width direction of the substrate **24**, which is a direction orthogonal to the direction of the optical axis C and the vertical direction. The second space **203** is continuous with a space above the light guidance body **40** in the internal space of the lamp chamber. The upper space is wider than the second space **203**. As described above, since the second space **203** communicates with the first space **201** via the recessed part **441***a*, the light source **22***a* and the edge **24***c* are located between the first space **201** and the second space **203**.

Next, a description will be given as to a low beam light distribution pattern and a high beam light distribution pattern, each of which is formed by light emitted from the vehicular lamp **100**. Each light distribution pattern will be described as being formed on a virtual vertical screen disposed 25 m ahead of a vehicle.

First, the low beam light distribution pattern will be described. Most of the light from the light source **22***b* incident on the light guidance body **40** from the incident surface **44***b* directly reaches the first emission surface **42**A, and is emitted from the first emission surface **42**A toward the projection lens **30** as obliquely downward light. In addition, a part of the light from the light source **22***b* reaches the first emission surface **42**A after being totally reflected by the connection surface **42**C, and is emitted from the first emission surface **42**A toward the projection lens **30** as obliquely upward light. The same applies to the light from the light sources **22***a* and **22***c*. Light from the light sources **22***a*, **22***b*, and **22***c* forms the low beam light distribution pattern. The low beam light distribution pattern is a light distribution pattern formed by inversely projecting a projection image formed on the first emission surface **42**A by the projection lens **30**. The low beam light distribution pattern is formed in an outer shape substantially corresponding to the outer shape of the first emission surface **42**A. Since the light guidance body **40** is disposed such that the first emission surface **42**A is positioned at the rear focal plane of the projection lens **30**, in the low beam light distribution pattern, a cutoff line is formed by the lower end edge **42**Aa of the first emission surface **42**A.

Next, the high beam light distribution pattern will be described. A pair of portions of the light from the light source **22***d* incident on the light guidance body **40** from the incident surface **44***d* is emitted from the second emission surface **42**B and reaches the projection lens **30**. The light from the light source **22***d* forms an additional light distribution pattern positioned above the cutoff line of the low beam light distribution pattern with respect to the low beam light distribution pattern. The additional light distribution pattern is a light distribution pattern formed by allowing the projection lens **30** to inversely project a projection image formed on the rear focal plane of the projection lens **30** by the light emitted from the second emission surface **42**B. When the additional light distribution pattern is added to the low beam light distribution pattern, the high beam light distribution pattern is formed. Since the upper end position of the projection image is defined by the lower end edge **42**Aa of the first emission surface **42**A, the lower end position of the additional light distribution pattern is defined by the cutoff line. Therefore, in the high beam light distribution pattern, the low beam light distribution pattern and the additional light distribution pattern are connected to each other without a gap therebetween.

Next, a flow of gas in the first space **201** and the second space **203** will be described.

Heat from the light source **22***a* warms gas between the light source **22***a* and the incident surface **44***a*, and the warmed gas rises. Since the second space **203** is provided above the first space **201**, the warmed gas flows from the first space **201** to the second space **203**. Since the width of the second space **203** is wider than the width of the first space **201**, the gas easily flows from the first space **201** to the second space **203** and easily flows through the second space **203** as compared with a case in which the width of the second space **203** is the same as the width of the first space **201**. In addition, the gas flows from the second space **203** to a space above the light guidance body **40**. Since the upper space is wider than the second space **203**, the gas easily flows from the second space **203** to the upper space. When the gas flows in this manner, heat is suppressed from being accumulated between the light source **22***a* and the incident surface **44***a*.

In the vehicular lamp disclosed in Patent Literature 1, the light source and the light guidance body are brought close to each other, so that most of the light from the light source enters the light guidance body, and utilization efficiency of the light is increased. Meanwhile, as the light source and the light guidance body are brought closer to each other, the heat from the light source tends to be accumulated between the light source and the light guidance body. When the light guidance body is made of resin, the light guidance body may be deformed by the heat accumulated between the light source and the light guidance body. When the light guidance body is deformed, a course of light traveling inside the light guidance body and a course of light traveling from the light guidance body to the projection lens are changed and, as such, a light distribution pattern formed by light emitted from the vehicular lamp may be changed to an unintended shape.

Therefore, the vehicular lamp **100** of the present embodiment includes the substrate **24**, the light source **22***a* mounted on the substrate **24**, the projection lens **30** disposed in front of the light source **22***a*, and the light guidance body **40** having the incident surface **44***a* on which light from the light source **22***a* is incident, in which the light guidance body **40** is disposed between the light source **22***a* and the projection lens **30** and emits the light toward the projection lens **30**. The first space **201** and the second space **203** are provided on a side closer to the light source **22***a* than to the incident surface **44***a*, in which the first space **201** is provided between the first region **441***b* and the substrate **24**, the first region **441***b* including, on the incident surface **44***a*, a part of an outer peripheral edge of the incident surface **44***a*, and the second space **203** communicates with the first space **201** and is in contact with the second region **441***c* including, on the incident surface **44***a*, the other part of the outer peripheral edge of the incident surface **44***a*. The width of the second space **203** is wider than the width of the first space **201** in an emission direction of the light from the light source **22***a*.

In the vehicular lamp **100**, since the width of the second space **203** is wider than the width of the first space **201**, gas can easily flow through the second space **203** as compared with a case in which the width of the second space **203** is the same as the width of the first space **201**. When the gas easily flows, heat is less likely to be accumulated between the light source **22***a* and the incident surface **44***a*, thereby making it possible to suppress deformation of the light guidance body

40 due to the heat. When the deformation is suppressed, the light traveling inside the light guidance body **40** and the light traveling from the light guidance body **40** to the projection lens **30** can be suppressed from traveling in an unintended direction, thereby making it possible to suppress a change in the light distribution pattern to an unintended shape.

In addition, the vehicular lamp **100** further includes the heat sink **70** including the base plate **72** on which the substrate **24** is disposed, in which the base plate **72** includes the non-overlapping part **72***a* that does not overlap the substrate **24**, and the second space **203** is provided between the second region **441***c* of the incident surface **44***a* and the non-overlapping part **72***a*.

According to this configuration, since the second space **203** is in contact with the base plate **72**, heat between the light source **22***a* and the incident surface **44***a* can be easily transmitted from the second space **203** to the base plate **72** in contact with the second space **203** as compared with a case in which the second space **203** is not in contact with the base plate **72**. Therefore, in the second region **441***c*, deformation of the light guidance body **40** due to heat can be suppressed. In addition, since the substrate **24** is not formed in the second space **203**, the gas flowing through the second space **203** is less likely to receive radiant heat from the substrate **24** than the first space **201**, thereby making it possible to suppress the temperature rise of gas. It is noted that the second space **203** may not be provided between the second region **441***c* of the incident surface **44***a* and the non-overlapping part **72***a*.

Further, the substrate **24** is disposed non-horizontally, and the second space **203** is provided above the first space **201**.

The gas warmed by the heat between the light source **22***a* and the incident surface **44***a* rises. When the second space **203** is provided above the first space **201**, the warmed gas flows from the first space **201** to the second space **203**, the width of which is wider than that of the first space **201**. In this case, the gas can easily flow as compared with a case in which the first space **201**, the width of which is narrower than that of the second space **203**, is provided above the second space **203**, thereby making it possible to suppress accumulation of heat between the light source **22***a* and the incident surface **44***a* in natural air cooling. It is noted that the substrate **24** may not be disposed non-horizontally, and the second space **203** may not be provided above the first space **201**.

Further, even when either the low beam light distribution pattern or the high beam light distribution pattern is formed, the light travels on the upper side of the light guidance body **40**. Therefore, the temperature of the upper side of the light guidance body **40** tends to be higher than that of the lower side of the light guidance body **40** through which light travels only when the high beam light distribution pattern is formed. Since the upper side of the light guidance body **40** having a high temperature is in contact with the second space **203**, the heat from the light guidance body **40** is transferred to the gas flowing through the second space **203** and rises together with the gas. Therefore, the temperature rise on the upper side of the light guidance body **40** is suppressed.

It is noted that the second space **203** of the present embodiment is provided between the second region **441***c* of the incident surface **44***a* and the non-overlapping part **72***a*, but the present invention is not limited thereto, and a modification of the second space **203** will be described below.

FIG. **8** is a diagram illustrating a first modification of the second space **203**.

In the second space **203** of the present modification, the base plate **72** is not disposed on the side opposite to the second region **441***c* with the second space **203** interposed therebetween, and the second space **203** is not in contact with the base plate **72**. Although not illustrated, the second region **441***c* may face the back surface of the lamp body **102**.

FIG. **9** is a diagram illustrating a second modification of the second space **203**.

The substrate **24** of the present modification includes a main body part **24***d* including a region facing the first region **441***b* of the incident surface **44***a*, and an extension part **24***e* facing the second region **441***c* of the incident surface **44***a*, in which the extension part **24***e* is thinner than the main body part **24***d*. The extension part **24***e* is a portion obtained by cutting out a part of the main body part **24***d*, is connected to the main body part **24***d*, and extends upwards from the main body part **24***d*. When the substrate **24** is viewed from the front, the extension part **24***e* covers the base plate **72**, and the non-overlapping part **72***a* is not provided in this modification. When the substrate **24** is viewed from the front, a boundary between the main body part **24***d* and the extension part **24***e* overlaps the recessed part **441***a* provided on the incident surface **44***a*. The second space **203** of the present modification is provided between the second region **441***c* of the incident surface **44***a* and the extension part **24***e*, and is not in contact with the base plate **72**. The light sources **22***a*, **22***b*, **22***c*, and **22***d* are provided in the main body part **24***d*. Additionally, when the substrate **24** is viewed from the front, the upper edge of each of the light sources **22***a*, **22***b*, **22***c*, and **22***d* overlaps the upper edge of main body part **24***d*.

According to the configuration of the present modification, the substrate **24** can be widened as compared with a case in which the extension part **24***e* is not provided. It is noted that the configuration of the present modification is not essential.

Further, the configuration of the heat sink **70** is not limited to the above description, and a modification of the heat sink **70** will be described below. FIG. **10** is a diagram illustrating a modification of the heat sink **70**, and is a cross-sectional view taken along line A-A illustrated in FIG. **1**. FIG. **11** is a cross-sectional view taken along line D-D illustrated in FIG. **10**.

In the heat sink **70** of the present modification, the base plate **72** includes a plurality of base plate pieces **721** disposed side by side with an interval therebetween in the horizontal direction and disposed on the back surface **24***a* of the substrate **24**. The base plate pieces **721** adjacent to each other are not connected to each other. The heat radiation fin **74** is disposed on each of the base plate pieces **721**.

The heat radiation fins **74**, each of which is provided in a corresponding one of the base plate pieces **721** adjacent to each other, are connected to each other by a connection part **74***a* formed to be integrated with the heat radiation fins **74**, and the adjacent base plate pieces **721** are configured as one unit. The heat radiation fins **74** connected to each other include, in the base plate pieces **721** adjacent to each other, the heat radiation fin **74** located closest to the other base plate piece **721** of the one base plate pieces **721** and the heat radiation fin **74** located closest to the one base plate piece **721** of the other base plate pieces **721**. The connection part **74***a* is provided in the heat radiation fin **74**. The connection part **74***a* has a rectangular outer shape, and extends from the upper end to the lower end of each of the principal surfaces facing each other among the heat radiation fins **74** adjacent to each other in the vertical direction.

Since the base plate pieces **721** are disposed side by side with an interval therebetween as described above, an exposed region **24***f* exposed from the base plate **72** and located on the back surface **24***a* of the substrate **24** is provided between the base plate pieces **721** adjacent to each other. Therefore, the substrate **24** is provided with the exposed region **24***f* exposed from the base plate **72** and located on the back surface **24***a*. The exposed region **24***f* is a region exposed between the base plate pieces **721** adjacent to each other and located on the back surface **24***a*, and is also a region exposed between the heat radiation fins **74** adjacent to each other on the base plate pieces **721** adjacent to each other and located on the back surface **24***a*. The exposed region **24***f* may be exposed in at least a part of the back surface **24***a*, in which the part is located between the heat radiation fins **74** adjacent to each other. The exposed region **24***f* is located on the opposite side of the light sources **22***a*, **22***b*, and **22***c* with respect to the substrate **24**, and extends from the upper end to the lower end of the substrate **24** in the vertical direction. Therefore, there are three exposed regions **24***f*, and each of the exposed regions **24***f* overlaps a corresponding one of the light sources **22***a*, **22***b*, and **22***c* and a corresponding one of the incident surfaces **44***a*, **44***b*, and **44***c* when the substrate **24** is viewed from the front. The exposed region **24***f* overlapping the light source **22***b* and the incident surface **44***b* also overlaps the light source **22***d* and the incident surface **44***d*. Therefore, when the substrate **24** is viewed from the front, the base plate pieces **721** adjacent to each other are disposed in parallel with an interval therebetween so as not to overlap the light sources **22***a*, **22***b*, **22***c*, and **22***d*.

The heat sink **70** is provided with a third space **205** in contact with the exposed region **24***f*, the base plate **72**, and the heat radiation fins **74** adjacent to each other. The third space **205** is a heat sink side space provided between the heat radiation fins **74** adjacent to each other. Since the number of exposed regions **24***f* is three, three third spaces **205** are also provided. The configurations of the respective third spaces **205** are the same. Since the connection part **74***a* is provided in the present modification, the third space **205** is a slit surrounded by the exposed region **24***f*, the base plate pieces **721** adjacent to each other, the heat radiation fins **74** adjacent to each other, and the connection part **74***a*. Further, the third space **205** is opened on the upper end side and the lower end side. It is noted that the third space **205** is opened rearwards when the connection part **74***a* is not provided or when the connection part **74***a* is provided partially between the upper end and the other end of the heat radiation fin **74**. The third space **205** extends from the upper end to the lower end of the base plate **72** in the vertical direction. The third space **205** is a flow path through which gas can flow.

When the substrate **24** is viewed from the front, the third space **205** overlaps the substrate **24**. Further, when the substrate **24** is viewed from the front, each of the third spaces **205** overlaps a corresponding one of the light sources **22***a*, **22***b*, **22***c*, and **22***d* and a corresponding one of the incident surfaces **44***a*, **44***b*, **44***c*, and **44***d*. As described above, since the exposed region **24***f* overlapping the light source **22***b* also overlaps the light source **22***d*, the third space **205** overlapping the light source **22***b* and the incident surface **44***b* also overlaps the light source **22***d* and the incident surface **44***d*. In the horizontal direction, the width of each of the third spaces **205** is wider than the width of each of the light sources **22***a*, **22***b*, **22***c*, and **22***d*. In the horizontal direction, the width of each of the third spaces **205** is narrower than the maximum width of each of the incident surfaces **44***a*, **44***b*, **44***c*, and **44***d*. The width of each of the third spaces **205** may be the same as or narrower than the width of each of the light sources **22***a*, **22***b*, and **22***c*. The width of each of the third spaces **205** may be the same as or wider than the maximum width of each of the incident surfaces **44***a*, **44***b*, **44***c*, and **44***d*. The third space **205** overlaps the substrate **24** and merges with the second space **203** when the substrate **24** is viewed from the front.

As described above, in the heat sink **70** of the present modification, the third space **205** in contact with the exposed region **24***f* exposed from the base plate **72** in at least a part of the back surface **24***a* of the substrate **24**, in which the part is located between the heat radiation fins **74** adjacent to each other, the base plate **72**, and the heat radiation fins **74** adjacent to each other is provided between the heat radiation fins **74** adjacent to each other.

In the vehicular lamp **100**, the substrate **24** is made of metal, and the thermal conductivity of metal is higher than the thermal conductivity of resin as compared with a case in which the substrate **24** is made of resin, so that the heat from the light source **22***a* can be easily transferred to the base plate **72** via the substrate **24**. Since the heat transferred to the base plate **72** is radiated from the heat radiation fin **74**, the substrate **24** can be easily cooled. In addition, in the vehicular lamp **100**, since the exposed region **24***f* is in contact with the third space **205**, heat is also directly radiated from the exposed region **24***f* which is a part of the substrate **24**. In this case, the substrate **24** can be easily cooled as compared with a case in which heat is not directly radiated from the substrate **24**. When the substrate **24** is cooled in this manner, the heat from the light source **22***a* can be easily transferred to the substrate **24**, and cooling efficiency of the light source **22***a* can be improved. Furthermore, when the light source **22***a* is cooled, the wavelength of light emitted from the light source **22***a* can be suppressed from being shifted by heat, and light of a predetermined color can be emitted. Furthermore, when the heat from the light source **22***a* is transferred to the substrate **24**, deformation of the light guidance body **40** due to the heat can be further suppressed. It is noted that the configuration of the present modification is not essential.

In addition, in the vehicular lamp **100** of the present modification, the third space **205** merges with the second space **203**. In this configuration, when the gas flows from the third space **205** to the second space **203** and the gas flowing through the third space **205** is faster than the gas flowing through the second space **203**, the gas flowing through the second space **203** is drawn by the gas merging with the second space **203** from the third space **205**. As a result, the speed of the gas flowing through the second space **203** increases. Therefore, the light guidance body **40** can be cooled. Conversely, when the gas flowing through the second space **203** is faster than the gas flowing through the third space **205**, the gas flowing through the third space **205** is drawn by the gas flowing through the second space **203**, and the speed of the gas flowing through the third space **205** increases. Therefore, the heat sink **70** can be cooled. Further, the third space **205** is in contact with the exposed region **24***f* of the back surface **24***a* of the substrate **24**. When the speed of the gas flowing through the third space **205** increases as described above, the substrate **24** can be cooled via the exposed region **24***f*. It is noted that the third space **205** may not merge with the second space **203**.

In addition, in the vehicular lamp **100** of the present modification, the third space **205** overlaps the light source **22***a*. In this case, as compared with a case in which the third space **205** does not overlap the light source **22***a*, the heat from the light source **22***a* can be easily transferred to the gas flowing through the third space **205** via the substrate **24**. It is noted that at least a part of the third space **205** may overlap the light source **22***a*. Here, the third space **205** overlapping the light source **22***a* has been described, but the same applies to the third space **205** overlapping another light source. When the substrate **24** is viewed from the front, the third space **205** may not overlap the light source **22***a*.

It is noted that the third space **205** is not necessarily provided at three locations, and may be provided so as to overlap any one of the light source **22***a*, the light sources **22***b* and **22***d*, and the light source **22***c* when the substrate **24** is viewed from the front. Further, when the substrate **24** is viewed from the front, the third space **205** may be provided so as not to overlap the light sources **22***a*, **22***b*, **22***c*, and **22***d*. The third space **205** may overlap at least a part of the incident surface **44***a*. When the substrate **24** is cooled, the heat from the light source **22***a* is easily transferred to the substrate **24**. Therefore, when the third space **205** overlaps at least a part of the incident surface **44***a*, the heat from the light source **22***a* is less likely to be transferred to the incident surface **44***a*, and the heat is less likely to be accumulated between the light source **22***a* and the incident surface **44***a*, as compared with a case in which the third space **205** does not overlap the incident surface **44***a*. As a result, deformation of the light guidance body **40** due to the heat can be suppressed. When the deformation of the light guidance body **40** is suppressed, the light traveling inside the light guidance body **40** and the light emitted from the light guidance body **40** can be suppressed from traveling in an unintended direction, and a change in the light distribution pattern to an unintended shape can be suppressed. In the above description, the incident surface **44***a* has been used, but the same applies to the other incident surfaces. The exposed region **24***f* may be a portion of the back surface **24***a* of the substrate **24**, in which the portion is exposed from the base plate **72**. Therefore, the exposed region **24***f* may be exposed by a through hole provided in the base plate **72**. Further, the base plate pieces **721** adjacent to each other are not connected to each other, but may be connected to each other such that the exposed region **24***f* is provided. The non-overlapping part **72***d* may be the above-described through hole.

Second Embodiment

Next, a second embodiment of the present invention will be described. It is noted that the same or equivalent components as those of the first embodiment are denoted by the same reference numerals and redundant description is omitted unless otherwise specified.

FIG. **12** is an enlarged view of the periphery of the base plate **72** according to the present embodiment. In the base plate of the present embodiment, the configuration of the connection part **74***a* is different from the configuration of the connection part **74***a* illustrated in FIG. **10** of the first embodiment.

The connection part **74***a* of the present embodiment has a hexagonal outer shape and an inner shape, and has a hollow shape. The connection part **74***a* extends from the upper end to the lower end of each of the principal surfaces facing each other among the heat radiation fins **74** adjacent to each other in the vertical direction. The connection part **74***a* is integrated with the heat radiation fin, but may be separated from the heat radiation fin. The connection part **74***a* increases the surface area of the heat radiation fin **74**. It is noted that the shape of the connection part **74***a* is not particularly limited. Further, the connection part **74***a* may be provided between the upper end and the other end of the principal surface. In addition, the connection part **74***a* may not be provided, and the heat radiation fins **74** may not be connected to each other.

Additionally, when the plurality of heat radiation fins **74** are disposed on one base plate piece **721**, the respective heat radiation fins **74** are not connected to each other, but may be connected to each other as described above.

FIG. **13** is a front view of the substrate **24**. In FIG. **13**, a portion of the base plate piece **721**, the portion overlapping the substrate **24**, and the incident surfaces **44***a*, **44***b*, **44***c*, and **44***d* are indicated by broken lines. The base plate piece **721** is shown slightly smaller than the substrate **24** for ease of understanding. The substrate **24** of the present embodiment is different from that of the first embodiment in that the substrate **24** has a horizontally long rectangular shape, a part of the substrate **24** is not cut, and the opening **24***b* is not provided in the substrate **24**.

FIG. **14** is a cross-sectional view taken along line E-E illustrated in FIG. **13**.

In the present embodiment as well, the first space **201**, which is a light source-side space, is provided between the light source **22***a* side and the incident surface **44***a* of the light guidance body **40** on which the light from the light source **22***a* is incident. The substrate **24** of the present embodiment is not provided with the opening **24***b* described in the first embodiment. Therefore, the second region **441***c* of the light guidance body **40** faces the substrate **24**, which is different from the first embodiment. In addition, the second space **203** of the present embodiment is different from that of the first embodiment in that the second space **203** is provided between the second region **441***c* and the substrate **24**. Therefore, when the substrate **24** is viewed from the front, the second region **441***c* overlaps the second space **203** and the substrate **24**, and the substrate **24** is disposed on the opposite side of the second region **441***c* with the second space **203** interposed therebetween.

Since the first region **441***b* and the second region **441***c* are provided on the same plane, the widths of the first space **201** and the second space **203** are the same in the optical axis C direction which is the emission direction of the light from the light source **22***a*. In the emission direction of the light from the light source **22***a*, the width of the first space **201** is narrower than the width of the third space **205**, and the first space **201** and the second space **203** overlap the third space **205** when the substrate **24** is viewed from the front.

Next, transfer of heat from the light source **22***a* by driving of the light source **22***a* will be described.

Since the substrate **24** is made of metal, the heat from the light source **22***a* is transferred to the substrate **24** more than the gas in the first space **201** and the second space **203** between the light source **22***a* and the incident surface **44***a*. The heat transferred to the substrate **24** is transferred from the base plate piece **721** to the heat radiation fin **74**, and is radiated from the heat radiation fin **74** and the connection part **74***a*. In addition, since the exposed region **24***f* is in contact with the third space **205**, heat is also directly radiated from the exposed region **24***f* which is a part of the substrate **24**. In this case, the substrate **24** is easily cooled as compared with a case in which heat is not directly radiated from the substrate **24**. When the gas flows through the third space **205**, the gas is in contact with the exposed region **24***f*. When the gas is in contact with the exposed region **24***f*, the substrate **24** is cooled as compared with a case in which the gas is not in contact with the exposed region **24***f*. As described above, the heat from the light source **22***a* is easily transferred to the substrate **24**, and the light source **22***a* is cooled. Although the light source **22***a* has been described above, the same applies to heat from the other light sources **22***b*, **22***c*, and **22***d*.

It is noted that a part of the heat from the light source **22***a* warms the gas between the light source **22***a* and the incident surface **44***a*, and the warmed gas rises. As described in the first embodiment, the warmed gas flows from the second space **203** to the space above the light guidance body **40**. When the gas flows, accumulation of heat is suppressed between the second spaces **203**.

In the vehicular lamp disclosed in Patent Literature 2, the light source is cooled by heat radiation from the heat radiation fins, but there is a demand for facilitating cooling of the light source to improve cooling efficiency of the light source.

Therefore, the vehicular lamp **100** of the present embodiment includes the metal substrate **24**, the light source **22***a* mounted on the front surface of the substrate **24**, and the heat sink **70** disposed on the back surface **24***a* of the substrate **24**. The heat sink **70** includes the base plate **72** disposed on the back surface **24***a* and the plurality of heat radiation fins **74** disposed in parallel with an interval therebetween on a surface of the base plate **72**, in which the surface is located on a side opposite to a side facing the substrate **24**. In the heat sink **70**, the third space **205** in contact with the exposed region **24***f* exposed from the base plate **72** in at least a part of the back surface **24***a*, in which the part is located between the heat radiation fins **74** adjacent to each other, the base plate **72**, and the heat radiation fins **74** adjacent to each other is provided between the heat radiation fins **74** adjacent to each other.

In the vehicular lamp **100**, the substrate **24** is made of metal. In this case, since the thermal conductivity of metal is higher than the thermal conductivity of resin as compared with a case in which the substrate **24** is made of resin, heat from the light source **22***a* can be easily transferred to the base plate **72** via the substrate **24**. Since the heat transferred to the base plate **72** is radiated from the heat radiation fin **74**, the substrate **24** can be easily cooled. In addition, in the vehicular lamp **100**, since the exposed region **24***f* is in contact with the third space **205**, heat is also directly radiated from the exposed region **24***f* which is a part of the substrate **24**. In this case, the substrate **24** can be easily cooled as compared with a case in which heat is not directly radiated from the substrate **24**. When the substrate **24** is cooled in this manner, the heat from the light source **22***a* can be easily transferred to the substrate **24**, and cooling efficiency of the light source **22***a* can be improved. Furthermore, when the light source **22***a* is cooled, the wavelength of light emitted from the light source **22***a* can be suppressed from being shifted by heat, and light of a predetermined color can be emitted.

The third space **205** overlaps the light source **22***a* when the substrate **24** is viewed from the front.

According to this configuration, as compared with a case in which the third space **205** does not overlap the light source **22***a*, the region of the substrate **24** overlapping the light source **22***a* can be easily cooled by the gas flowing through the third space **205**. When the region is cooled, cooling efficiency of the light source **22***a* can be improved. Although the entire light source **22***a* overlaps the third space **205** of the present embodiment, the third space **205** may overlap at least a part of the light source **22***a*. Further, the third space **205** may not overlap the light source **22***a*.

When the substrate **24** is viewed from the front, the width of the third space **205**, which is the heat sink side space, is wider than the width of the light source **22***a*.

In this configuration, when the width of the third space **205** increases, the width of the exposed region **24***f* increases, heat is easily transferred from the exposed region **24***f* to the third space **205**, and the substrate **24** is easily cooled. Further, when the width of the third space **205** increases, the gas can easily flow through the third space **205**. When the gas easily flows, heat is hardly accumulated in the third space **205**, and the substrate **24** is easily cooled. When the substrate **24** is cooled, the heat from the light source **22***a* can be easily transferred to the substrate **24**, and the cooling efficiency of the light source **22***a* can be improved. Furthermore, in this configuration, a region of the substrate **24** around the light source **22***a* can be cooled, and when the region is cooled, the heat from the light source **22***a* is diffused to the region, so that the cooling efficiency of the light source **22***a* can be further improved. It is noted that the width of the third space **205** may be equal to or smaller than the width of the light source **22***a*.

Additionally, the heat radiation fins **74** respectively provided in the base plate pieces **721** adjacent to each other are connected to each other.

According to this configuration, the base plate pieces **721** adjacent to each other with the heat radiation fin **74** interposed therebetween are configured as one unit. In this case, the number of attachment steps of the heat sink **70** can be reduced as compared with a case in which the heat radiation fins **74** are not connected to each other. It is noted that the heat radiation fins **74** may not be connected to each other.

Further, the vehicular lamp **100** of the present embodiment further includes the light guidance body **40** that has the incident surface **44***a* on which the light from the light source **22***a* is incident, is disposed in front of the light source **22***a*, and guides the light, in which the third space **205** overlaps the incident surface **44***a* when the substrate **24** is viewed from the front. It is noted that the third space **205** of the present embodiment overlaps a part of the incident surface **44***a*, but may overlap at least a part of the incident surface **44***a*.

As described above, when the substrate **24** is cooled, the heat from the light source **22***a* is easily transferred to the substrate **24**. Therefore, when the third space **205** overlaps at least a part of the incident surface **44***a*, the heat from the light source **22***a* is less likely to be transferred to the incident surface **44***a* as compared with a case in which the third space **205** does not overlap the incident surface **44***a*. In addition, heat is less likely to be accumulated between the light source **22***a* and the incident surface **44***a*, and deformation of the light guidance body **40** including the incident surface **44***a* due to the heat can be suppressed. When the deformation of the light guidance body **40** is suppressed, the light traveling inside the light guidance body **40** and the light emitted from the light guidance body **40** can be suppressed from traveling in an unintended direction, and a change in the light distribution pattern to an unintended shape can be suppressed. It is noted that, when the substrate **24** is viewed from the front, the third space **205** may not overlap the incident surface **44***a*.

Although a relationship between the light source **22***a* and the third space **205** and a relationship between the incident surface **44***a* and the third space **205** have been described above, the same applies to a relationship between the other light sources **22***b*, **22***c*, and **22***d* and the third space **205** and a relationship between the incident surfaces **44***b*, **44***c*, and **44***d* and the third space **205**.

It is noted that, although the entire third space **205** of the present embodiment has been described as overlapping the substrate **24**, the present invention is not limited thereto, and a first modification of the third space **205** will be described below. The present modification is different from the third space **205** of the present embodiment in that a part of the third space **205** extends outside the substrate **24**.

FIG. **15** is a front view of the substrate **24** according to the first modification of the present embodiment. FIG. **16** is a cross-sectional view taken along line F-F illustrated in FIG. **15**.

The substrate **24** of the present modification has the same configuration as the substrate **24** of the first embodiment. Therefore, the opening **24***b* is provided in the substrate **24** of the present modification. When the substrate **24** is viewed from the front, an upper end edge of each of the light sources **22***a*, **22***b*, and **22***c* is located below an edge **24***c* of the substrate **24**, in which the edge **24***c* is in contact with a lower end edge of the opening **24***b*. The opening **24***b* allows the base plate piece **721** of the base plate **72** to have a non-overlapping part **721***a* that does not overlap the substrate **24** and an overlapping part **721***b* that overlaps the substrate **24**. The non-overlapping part **721***a* is a portion of the base plate piece **721**, the portion being exposed from the substrate **24**. The non-overlapping part **721***a* does not overlap the incident surfaces **44***a*, **44***b*, **44***c*, and **44***d*, the incident surfaces **44***a*, **44***b*, **44***c*, and **44***d* overlap the substrate **24**, and a part of the outer peripheral edges of the incident surfaces **44***a*, **44***b*, and **44***c* overlaps the edge **24***c*. The edge **24***c* overlaps a boundary between the non-overlapping part **721***a* and the overlapping part **721***b*. Although not illustrated herein, the heat radiation fin **74** extends to the non-overlapping part **721***a*.

When the substrate **24** is viewed from the front, the third space **205** of the present modification extends to the edge **24***c* of the substrate **24** overlapping the boundary between the non-overlapping part **721***a* and the overlapping part **721***b*, and is opened on the non-overlapping part **721***a* side. Further, the third space **205** communicates with a non-overlapping part side space **301***a* provided between the non-overlapping parts **721***a* of the base plate pieces **721** adjacent to each other via the opening. The heat radiation fin **74** in contact with the third space **205** extends in the non-overlapping part **721***a*, and the heat radiation fin **74** is in contact with the non-overlapping part side space **301***a*. The non-overlapping part side space **301***a* is opened on the side of the substrate **24**, above the substrate **24**, and behind the substrate **24**.

In this configuration, the third space **205** extends to the edge **24***c* of the substrate **24** overlapping the boundary between the non-overlapping part **721***a* and the overlapping part **721***b* when the substrate **24** is viewed from the front. In this case, the third space **205** is opened on the non-overlapping part **721***a* side. When the gas flowing through the third space **205** and the gas flowing through the second space **203** merge via the opening of the third space **205** and the non-overlapping part side space **301***a*, and the gas flowing through the third space **205** is faster than the gas flowing through the second space **203**, the gas flowing through the second space **203** is drawn by the gas flowing through the third space **205**, and the speed of the gas flowing through the second space **203** increases. Therefore, the light guidance body **40** can be cooled. Conversely, when the gas flowing through the second space **203** is faster than the gas flowing through the third space **205**, the gas flowing through the third space **205** is drawn by the gas flowing through the second space **203**, and the speed of the gas flowing through the third space **205** increases. Therefore, the heat sink **70** can be cooled. It is noted that the third space **205** may not extend to the edge **24***c*.

Next, a second modification of the second embodiment will be described. FIG. **17** is a front view of the substrate **24** according to the second modification of the second embodiment. The present modification is different from the base plate **72** of the present embodiment in that the base plate piece **721** is not provided and one base plate **72** is provided. Additionally, the present modification is different from the third space **205** of the present embodiment in that the third space **205** is provided not between the base plate pieces **721** adjacent to each other but in the non-overlapping part **72***a* of the base plate **72**.

The base plate **72** of the present modification is provided with the non-overlapping part **72***a* that does not overlap the substrate **24**, and the non-overlapping part **72***a* is, for example, a slit. An exposed region **24***f* (not illustrated in FIG. **17**) is provided on the back surface **24***a* by the non-overlapping part **72***a*. When the substrate **24** is viewed from the front, the exposed region **24***f* overlaps the non-overlapping part **72***a*. The third space **205** is in contact with the exposed region **24***f*, the base plate **72**, and the heat radiation fins **74** adjacent to each other.

In the vehicular lamp **100** of the present modification, the third space **205** can be provided in one base plate **72** instead of being provided between the base plate pieces **721** adjacent to each other. It is noted that the non-overlapping part **72***a* of the present modification may be a through hole.

As described above, the present invention has been described by taking the above-described embodiments and modifications as examples, but the present invention is not limited thereto.

In the above embodiment and modification, the gas may flow from the first space **201** toward the second space **203** by a fan. In this case, the fan may be provided below the first space **201** for air blowing or may be provided above the second space **203** for suction. Alternatively, the gas may flow from the second space **203** toward the first space **201** by the fan. In this case, the fan may be provided below the first space **201** for suction or may be provided above the second space **203** for air blowing.

In the above embodiment and modification, the first space **201** and the second space **203** may be provided in a direction orthogonal to the emission direction of the light from the light sources **22***a*, **22***b*, and **22***c*, that is, in the horizontal direction. In this case, the fan is preferably provided on the first space **201** side or the second space **203** side as described above. When gas flows downwards by the fan, the first space **201** and the second space **203** may be provided on the light source **22***d* side.

In the above embodiment and modification, the non-overlapping part **72***a* may be a portion of the base plate **72**, in which the portion is exposed from the substrate **24**. Therefore, the non-overlapping part **72***a* may be exposed not only by the opening **24***b* but also by a through hole provided in the substrate **24**, or may be exposed by being positioned above the upper end edge of the rectangular substrate **24** in which the opening **24***b* is not provided.

In the above embodiment and modification, the recessed part **441***a* may not be provided. Further, when the substrate **24** is viewed from the front, the edge **24***c* may overlap an edge of the recessed part **441***a*, in which the edge is in contact with the second region **441***c*.

In the above embodiment and modification, the second space **203** may be the same as the first space **201** or shorter than the first space **201** in the vertical direction. In addition, the second space **203** may have the same depth as that of the first space **201** or a depth narrower than that of the first space **201** in the width direction of the substrate **24** which is a direction orthogonal to the optical axis C direction and the vertical direction.

In the above embodiment and modification, the light guidance body **40** has been described as being made of a resin such as polycarbonate, but may be made of a resin such as colorless transparent acrylic or colorless transparent glass.

In the above embodiment and modification, it has been described that all of the four light sources **22***a*, **22***b*, **22***c*, and **22***d* have the vertically long rectangular light emission surface. However, for example, the four light sources may have a light emission surface having another outer shape such as a square or a horizontally long rectangular shape.

In the above embodiment and modification, it has been described that the light source for the low beam includes the three light sources **22***a*, **22***b*, and **22***c*, and the light source for the additional lighting includes one light source **22***d*, but the number of these light sources is not particularly limited.

In the above embodiment and modification, the vehicular lamp **100** is a headlight, but is not particularly limited. For example, the vehicular lamp **100** may emit light constituting an image to an irradiated object such as a road surface. In addition, in a case where the vehicular lamp is configured to irradiate an irradiated object such as a road surface with light constituting an image, a direction of light emitted by the vehicular lamp or a position at which the vehicular lamp is attached to the vehicle is not particularly limited. In addition, the color of the light emitted from the vehicular lamp is preferably white, but is not particularly limited.

The connection part **74***a* of the heat sink **70** illustrated in FIG. **10** of the first embodiment may have the same configuration as the connection part **74***a* of the heat sink **70** of the present embodiment. Further, the connection part **74***a* of the heat sink **70** of the second embodiment may have the same configuration as the connection part **74***a* of the heat sink **70** illustrated in FIG. **10** of the first embodiment. Further, the heat sink **70** of the first embodiment and the modification thereof may be disposed on the substrate **24** of the second embodiment and the modification thereof instead of the heat sink **70** of the second embodiment and the modification thereof. The heat sink **70** of the second embodiment and the modification thereof may be disposed on the substrate **24** of the first embodiment and the modification thereof instead of the heat sink **70** of the first embodiment and the modification thereof.

According to the present invention, a vehicular lamp capable of suppressing a change in a light distribution pattern is provided, a vehicular lamp capable of improving cooling efficiency of a light source is provided, and the vehicular lamp can be used in the field of vehicle headlights such as automobiles.

The invention claimed is:

1. A vehicular lamp comprising:

a substrate;

a light source mounted on a front surface of the substrate;

a projection lens disposed in front of the light source; and

a light guidance body having an incident surface on which light from the light source is incident, wherein the light guidance body is disposed between the light source and the projection lens and emits the light toward the projection lens, wherein:

a first space and a second space are provided on a side closer to the light source than to the incident surface, wherein the first space is provided between a first region and the substrate, the first region including, on the incident surface, a part of an outer peripheral edge of the incident surface, and wherein the second space communicates with the first space and is in contact with a second region including, on the incident surface, the other part of the outer peripheral edge of the incident surface; and

a width of the second space is wider than a width of the first space in an emission direction of the light from the light source;

the substrate includes a main body part including a region facing the first region of the incident surface, and an extension part facing the second region of the incident surface and being thinner than the main body part; and

the second space is provided between the second region of the incident surface and the extension part.

2. The vehicular lamp according to claim **1**, wherein the substrate is not disposed on a side opposite to the second region with the second space interposed between the side and the second region.

3. The vehicular lamp according to claim **2**, further comprising a heat sink including a base plate disposed on a back surface of the substrate, wherein:

the base plate includes a non-overlapping part that does not overlap the substrate; and

the second space is provided between the second region of the incident surface and the non-overlapping part.

4. The vehicular lamp according to claim **1**, wherein, when the substrate is viewed from the front, a boundary between the first space and the second space overlaps a recessed part provided in the incident surface.

5. The vehicular lamp according to claim **1**, wherein:

the substrate is disposed non-horizontally; and

the second space is provided above the first space.

6. The vehicular lamp according to claim **1**, further comprising a heat sink including a base plate disposed on a back surface of the substrate and a plurality of heat radiation fins disposed in parallel with an interval therebetween on a surface of the base plate, wherein the surface is located on a side opposite to a side facing the substrate, wherein:

the substrate is made of metal; and

the heat sink is provided with a third space in contact with an exposed region, the base plate, and the heat radiation fins adjacent to each other, wherein the exposed region is exposed from the base plate in at least a part of the back surface, wherein the part is located between the heat radiation fins adjacent to each other.

7. The vehicular lamp according to claim **6**, wherein the third space merges with the second space.

8. The vehicular lamp according to claim **7**, wherein at least a part of the third space overlaps the light source when the substrate is viewed from the front.

9. A vehicular lamp comprising:

a metal substrate;

a light source mounted on a front surface of the substrate; and

a heat sink disposed on a back surface of the substrate, wherein the heat sink includes:

a base plate disposed on the back surface; and

a plurality of heat radiation fins disposed in parallel with an interval therebetween on a surface of the base plate, wherein the surface is located on a side opposite to a side facing the substrate, and

a light guidance body having an incident surface on which light from the light source is incident, wherein the light guidance body is disposed between the light source and the projection lens and emits the light toward the projection lens;

wherein the heat sink is provided with a heat sink side space in contact with an exposed region, the base plate, and the heat radiation fins adjacent to each other, wherein the exposed region is exposed from the base plate in at least a part of the back surface, wherein the part is located between the heat radiation fins adjacent to each other;

a first space and a second space are provided on a side closer to the light source than to the incident surface, wherein the first space is provided between a first region and the substrate, the first region including, on the incident surface, a part of an outer peripheral edge of the incident surface, and wherein the second space communicates with the first space and is in contact with a second region including, on the incident surface, the other part of the outer peripheral edge of the incident surface;

a width of the second space is wider than a width of the first space in an emission direction of the light from the light source;

the substrate includes a main body part including a region facing the first region of the incident surface, and an extension part facing the second region of the incident surface and being thinner than the main body part; and

the second space is provided between the second region of the incident surface and the extension part.

10. The vehicular lamp according to claim **9**, wherein at least a part of the heat sink side space overlaps the light source when the substrate is viewed from the front.

11. The vehicular lamp according to claim **10**, wherein a width of the heat sink side space is wider than a width of the light source when the substrate is viewed from the front.

12. The vehicular lamp according to claim **9**, wherein:

the base plate includes a plurality of base plate pieces disposed side by side with an interval therebetween on the back surface;

the heat radiation fin is disposed on each of the base plate pieces adjacent to each other; and

the exposed region is exposed between the base plate pieces adjacent to each other.

13. The vehicular lamp according to claim **12**, wherein the heat radiation fins, each of which is provided in a corresponding one of the base plate pieces adjacent to each other, are connected to each other.

14. The vehicular lamp according to claim **9**, further comprising a light guidance body having an incident surface on which light from the light source is incident, wherein the light guidance body is disposed in front of the light source and guides the light,

wherein the heat sink side space overlaps at least a part of the incident surface when the substrate is viewed from the front.

15. The vehicular lamp according to claim **14**, wherein:

the base plate includes a non-overlapping part that does not overlap the substrate and an overlapping part that overlaps the substrate; and

the heat sink side space extends to an edge of the substrate, wherein the edge overlaps a boundary between the non-overlapping part and the overlapping part when the substrate is viewed from the front.

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